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Hormones in Veterinary Medicine

(Complete Index on Page VIII)

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Necrology XLII

Septicemic Infections Of Newborn Foals*

E. R. DOLL,** M.S., D.V.M., and WILLIAM R. McGEE,†† D.V.M., Lexington, Kentucky

THE newborn foal is quite vulnerable to bacterial infection. Two microorganisms, *Shigella equuli* and hemolytic streptococci are responsible for the majority of infections and deaths of young foals. According to data compiled by Dimock, Edwards and Bruner,[1] streptococcic infections caused death of 25.7% of 810 foals and *Shig. equuli* infection was responsible for death of 31.5% of the same group.

The information obtained in their study indicated that streptococcic infection was often present when the foal was born, having been acquired during its intrauterine life. Only meager evidence of prenatal infection with *Shig. equuli* was obtained, most cases appearing to have acquired infection following birth. During the first week after birth, fatal cases of *Shig. equuli* infection exceeded those due to streptococci by a ratio of 2.6 to 1. For foals dying at ages of eight to 30 days, the cause of mortality was reversed with deaths from streptococci exceeding those from *Shig. equuli* by a ratio of 3.6 to 1. Uncomplicated septicemia due to the latter microorganism was characteristically a disease of the very young foal. Of 209 foals dying from this cause during the first month after birth, 197 died during the first week and, of these, 160 deaths were during the first three days. Relatively few foals succumbed to infection with *Escherichia coli, Corynebacterium equi,* and *Salmonella typhimurium.*

Before the introduction of the sulfonamide drugs and antibiotic agents, treatment of infections in young foals was very unsatisfactory. The procedure that appeared to be of greatest value was early blood transfusion using the dam's blood. The quantity of blood employed in transfusion varied from 300 to 500 cc., and at times the transfusion was repeated daily for two or three days. Cardiac and respiratory stimulants, combined with dextrose intravenously or subcutaneously, were used with little success. Hand feeding of the foal, using the mare's milk, canned milk diluted with lime water, or Nestle's food, appeared helpful in some cases.

Antibiotic Agents Prove Effective

Prevention of infection by practicing hygienic procedures at breeding time and selecting mares with healthy genital organs for breeding aided materially in reducing losses of newborn foals, particularly from streptococcic infections. The sulfonamides appeared to be beneficial in many cases, but left much to be desired in a therapeutic agent for these two infections. *In vitro* studies on the action of antibiotic agents against pathogenic organisms from equine infections indicated that they should have merit in treatment of infections of foals[2, 3]. Penicillin was quite active against streptococci, the growth of hemolytic streptococci isolated from infected fetuses, foals, and uteri of mares being inhibited completely by 0.02 and 0.03 unit per cc. of medium. Growth of *Streptococcus equi* was inhibited by 0.01 and 0.02 unit per cc. *Shig. equuli* required 2 to 4 units per cc. of medium for *in vitro* inhibition and *C. equi* was quite resistant, requiring 8 to 10 or more units per cc. of medium for complete inhibition of growth. Studies on the serum level response of horses following administration of various preparations of penicillin demonstrated that blood levels equal to or greater than the amount required for inhibition of streptococci were easily obtained[3, 4]. Blood levels of penicillin comparable to the *in vitro* sensitivity of *Shig. equuli* and *C. equi* were not obtained with reasonable dosage of penicillin. Clinical trials indicated that penicillin was ineffective in treatment of *Shig. equuli* infection.

Studies on the *in vitro* inhibition of organisms by streptomycin[3] demonstrated that strains of *Shig. equuli* isolated from dead foals were inhibited completely by 4 to 8 units per cc. of medium. *C. equi* required 8 to 16 units of streptomycin per cc. for *in vitro* inhibition and streptococci were not inhibited by 16 units per cc. of medium. *E. coli* strains isolated from fatally infected foals were inhibited by 4 to 8 units per cc. Studies on the serum level re-

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**Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington.

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sponse of foals following intramuscular administration of streptomycin,[3] showed that doses of 1 mg. per lb. of body weight at three-hour intervals resulted in serum concentrations of 4 to 8 units per cc.; doses of 2 mg. per lb. maintained serum levels of 8 to 16 units per cc. and doses of 4 mg. per lb. produced serum levels of 16 to 32 units per cc.

The results obtained from treatment of infected foals during the 1948 and 1949 foaling seasons with streptomycin or penicillin combined with streptomycin[6, 7] indicated that the infections were satisfactorily controlled. The dosage of streptomycin for the newborn foal was 0.5 gm. intramuscularly at three-hour intervals. This dosage was adequate for maintaining serum levels of 8 to 16 units per cc. The dosage of penicillin varied from 600,000 to 1,000,000 units intramuscularly once daily. The preparations used were penicillin in oil and wax, procaine penicillin in oil and aqueous suspension of procaine penicillin. In foals that appeared to be typically infected with *Shig. equuli,* streptomycin adequately controlled the infection. Foals apparently having streptococcic infections did not respond to treatment with streptomycin but recovered after institution of penicillin therapy. Similarly, some foals failed to respond to treatment with penicillin and recovered following administration of streptomycin. Because of the difficulty in establishing a definite diagnosis of the type of infection present in young foals, coadministration of penicillin and streptomycin was employed frequently. Streptomycin alone or the simultaneous use of penicillin and streptomycin appeared meritorious as a prophylactic measure for preventing the development of infection in congenitally weak foals. In these, streptomycin was administered at three-hour intervals for 12 to 36 hours and penicillin was administered once daily for one to three days.

A study of the *in vitro* activity of aureomycin[8] showed that *Shig. equuli* and *C. equi* were inhibited by very low concentrations, varying from 0.012 to 0.39 microgram per cc. of medium. Streptococci were quite variable in their susceptibility to the *in vitro* action of aureomycin, requiring up to 25 micrograms per cc. of medium for inhibition of growth. During the 1950 foaling season, data were obtained on selected cases that were treated with streptomycin and observations were made on the use of aureomycin for treatment of infections of the newborn foal. Observations made during this foaling season will be presented in this report. Diagnosis was made by clinical examination and the duration of treatment was governed by the response of the patient. For a detailed description of the nature and clinical manifestations of infections in the newborn foal, the reader is referred to the work of Dimock, Edwards, and Bruner[1]. All foals included in this study were Thoroughbreds.

Case Reports

Since the cases treated with streptomycin or coadministration of penicillin and streptomycin responded similarly to those previously reported,[6, 7] only those cases treated with aureomycin will be reported here. In accord with previous experience, most foals appearing to have *Shig. equuli* infections responded satisfactorily to treatment with streptomycin, 0.5 gm. at three-hour intervals. Also, the coadministration of penicillin and streptomycin gave satisfactory recoveries in foals showing a poorly defined symptom complex. A number of infected foals responded satisfactorily to streptomycin dosage of 2 gm. at 12-hour intervals. However, the number of cases was too limited for recommending this dosage schedule for general use. The percentage of recoveries was greater and the length of treatment was shorter for foals in which treatment was started early in the course of the disease. Streptomycin calcium chloride complex and dihydrostreptomycin appeared equally effective for treatment of infections in foals.

Case 1. Foaling was uneventful and the foal appeared normal for the first 48 hours after birth. Illness was first noticed at approximately 72 hours of age. Rectal temperature was 105 F. The foal was showing characteristic symptoms of acute toxemia and septicemia. There was a complete loss of equilibrium; the foal was unable to rise or stand. It received 1,000,000 units of aqueous suspension of procaine penicillin intramuscularly and 0.5 gm. doses of streptomycin at three-hour intervals during the first 24 hours of treatment but showed no improvement. Treatment with aureomycin was begun on the second day, using 500 mg. doses intravenously once daily. Improvement was observed within 24 hours and the foal could arise and nurse on the second day of treatment with aureomycin. The foal was hand fed and assisted in nursing during the first three days of illness. Treatment with aureomycin was discontinued on the fifth day. At five months of age the foal was developing normally. Foals which come to autopsy after illness of the type shown by this foal are usually infected with *Shig. equuli* or *E. coli.*

Case 2. At 12 hours after birth this foal developed an illness characterized by elevated temperature, disturbed consciousness, inability

Before the introduction of sulfonamide drugs and antibiotic agents, treatment of infections in young foals was unsatisfactory.

to stand, and running motions. The treatment was daily intravenous injection of 500 mg. doses of aureomycin for six days. Clinical improvement was observed within 12 hours after treatment was started and, at seven days, the foal appeared to have recovered completely. One week later it developed multiple infections of the leg joints. A second course of aureomycin treatment was given, using 500 mg. doses daily for six days. The acute nature of the infection subsided slowly, but the damage to the joints was not resolved. The foal was destroyed a few weeks later. It was not presented for postmortem examination.

Case 3. At 20 hours after birth, the foal was prostrate, semicomatose, and had an elevated temperature. It appeared typical of *Shig. equuli* infection. Two intravenous injections of 500 mg. of aureomycin were administered at 24-hour intervals. Improvement was evident 12 hours after the first dose. The foal was up and nursing on the third day. Convalescence was uneventful and it has developed normally.

Case 4. This foal was 30 days old when a call was made for treatment of infected joints. Daily doses of 500 mg. of aureomycin were administered intravenously for six days. There was no improvement in the condition of the joints. The foal was destroyed and was not available for bacteriological examination.

Case 5. This foal was three days of age at the onset of symptoms. The temperature was 104 F. It had developed a diarrhea and was prostrate and semicomatose. The symptoms were indicative of a *Shig. equuli* septicemia. The treatment consisted of one transfusion of 500 cc. of citrated whole blood and three daily doses of 500 mg. of aureomycin intravenously. Clinical improvement had occurred within 15 hours and the foal was up and nursing on the second day. Recovery was complete.

Case 6. With this foal, symptoms appeared on the second day following birth. The temperature was 104 F. The foal was weak, sleepy, listless, and refused to nurse, apparently being typically infected with *Shig. equuli*. It received two daily doses of 0.5 gm. of aureomycin intravenously. There was marked clinical improvement within 24 hours and complete recovery subsequently.

Case 7. Illness appeared in this foal within 24 hours after birth. This foal was making erratic movements and circling in the stall. The visible membranes were congested and the temperature was 103 F. Symptoms exhibited appeared typical of infections known to have terminated fatally in *Shig. equuli* septicemia. Transfusions of 500 cc. each of citrated blood were made on the first and second days of treatment. Daily doses of 500 mg. of aureomycin were administered intravenously for five days. Clinical improvement was observed within 24 hours and the foal became progressively stronger throughout the course of treatment. Recovery was complete.

Case 8. This foal became ill within 24 hours after birth. The temperature was 104 F. The hock joints were swollen and the foal was showing general symptoms of a septicemic infection. A single 1 gm. dose of streptomycin was given and it was followed by three daily doses of 0.5 gm. of aureomycin. The foal's

condition improved rapidly and it developed normally. The illness of this foal may have been caused by either *Shig. equuli* or streptococci.

Case 9. This foal was from an aged mare that developed a purulent vaginal discharge three weeks before foaling. The foal was weak and somewhat emaciated when it was born, but it showed no definite symptoms of being infected. Doses of 500 mg. of aureomycin were administered daily for three days, primarily as a prophylactic measure. The foal grew slowly but appeared to be developing normally as a weanling.

Case 10. When it was one week old, this foal developed a severe diarrhea. The temperature was 105 F. It had stopped nursing and was very weak. The treatment consisted of a diarrhea cordial containing pectin, kaolin, paregoric, and sulfathalidine, and three daily intravenous injections of 500 mg. of aureomycin. A transfusion of 500 cc. of citrated blood was given on the first day of the illness. The foal improved rapidly and has developed normally.

Case 11. This foal developed an illness that was characteristic of a *Shig. equuli* septicemia during the second day after birth. When treatment was started, it was prostrate and semicomatose. The temperature was 104 F. An enema was used to relieve constipation. One transfusion of 500 cc. of citrated blood was given. Two 500 mg. doses of aureomycin were administered at 24-hour intervals. The foal recovered rapidly and has developed normally.

Case 12. This foal was first observed when it was eight days of age. The temperature was elevated, there were toxic symptoms, and slight enlargement of the leg joints. Five daily doses of 500 mg. of aureomycin were administered. The acute general symptoms were relieved quickly and the foal appeared normal for approximately two weeks. At this time, it developed multiple arthritic infections which did not respond to a second course of treatment. The case terminated fatally with streptococcic infection in the joints.

In addition to the cases cited above, five foals one to three days of age received two-day treatments employing 500 mg. of aureomycin intravenously at 24 hour intervals. This group of foals had temperatures of approximately 103 F. They were weak, inactive, not nursing properly and had the general attitude of foals in the early stages of bacterial infections. All foals of this group responded rapidly and have developed normally.

Single treatments with 0.5 gm. doses of aureomycin intravenously were made on 20 foals. These administrations were made between six and 36 hours following birth of congenitally weak animals. Included in this group were foals born in a weak condition and those developing a poorly defined debility within 12 to 24 hours following birth. The purpose of the treatment was prophylaxis against possible infection. Veterinarians in the central Kentucky area estimate that 20 to 30% of such foals may develop serious or fatal infections if they do not have special care. Every foal of this group survived without showing symptoms of a serious infection.

Discussion

The results obtained from use of aureomycin for treatment of septicemic infections of newborn foals indicated that this antibiotic may prove to be very useful for control of *Shig. equuli* infections. The response in several foals showing symptoms typical of this infection was quite dramatic. Clinical improvement was apparent within 12 to 15 hours and foals often were up and nursing within 24 to 48 hours after treatment was initiated. Similar response was obtained from treatment with streptomycin or coadministration of penicillin and streptomycin. The period of treatment required for clinical recovery of the sick foal varied considerably for both streptomycin and aureomycin. With each antibiotic, some foals responded satisfactorily with 36 to 48 hours of treatment and others required continuous treatment for six days. The institution of treatment early in the course of the disease appeared to have considerable influence on the speed of recovery and the length of the period of treatment. Foals receiving treatment before they became severely ill usually responded rapidly and required short courses of treatment.

The recurrence of arthritic infections approximately one week after apparent clinical recovery, at least in one case, indicated that aureomycin may not effectively eliminate streptococcal infections. In these cases, the symptoms of systemic disturbance were relieved but the joint infections progressed, causing the animal to become useless. Failure to arrest joint infections has occurred with use of penicillin and streptomycin. Apparently extensive damage to the joints was prevented by early systemic treatment of infected foals with antibiotic agents. If treatment was delayed until the joints were injured extensively, administration of antibiotics seldom aided in resolution of the pathological changes.

The results obtained from prophylactic use of the antibiotics were very satisfactory. Streptomycin alone, coadministration of penicillin

and streptomycin, or aureomycin alone appeared to be quite efficient for preventing the development of infections in congenitally weak foals. In nearly all instances, prophylactic treatment for 24 to 48 hours has been adequate, permitting the foal to gain strength and maintain its health. A few weak foals have been maintained on prophylactic therapy with antibiotics for three to four days. Also, blood transfusion and hand feeding assist in getting the weak foal started.

General supportive care and symptomatic treatment should not be neglected in use of antibiotics for the infected foal. Those having severe infections usually were helped by blood transfusion. Constipation should be relieved by enemas and milk of magnesia, castor oil, mineral oil or other mild laxatives. Diarrhea should be controlled by use of antidiarrheal drugs. For intestinal bacteriostasis, sulfathalidine may be used effectively. For this purpose oral administration of 2 gm. of streptomycin twice daily appeared effective. Dehydrated foals require fluid replacement with saline or saline and dextrose.

The efficiency of the antibiotics, aureomycin, streptomycin and penicillin, for control of infections of young foals, was readily demonstrated in comparing mortality records of foals submitted for postmortem examination. For the period from 1921 to 1943, 706 dead foals were examined, with deaths from *Shig. equuli* and streptococci accounting for 33.5 and 24.5% respectively. During a three-year period, from 1948-1950, 251 dead foals were examined. Deaths from *Shig. equuli* were 12.3% and those from streptococci were 17.1%. Using the deaths occurring from 1921-1943 as the base mortality for these two infections, the reduction in mortality by antibiotic therapy during the three years from 1948-1950 was 63.2% for *Shig. equuli* infections and 32.6% for streptococcic infections.

Summary

Case reports on use of aureomycin for treatment of infections of newborn foals have been presented.

The use of aureomycin, streptomycin, and penicillin in treatment of infections in foals has been discussed.

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REFERENCES

1. Dimock, W. W., Edwards, P. R., and Bruner, D. W., Infections of Fetuses and Foals. Ky. Agr. Exp. Sta. Bul. 509 (Sept.), 1947.

2. Doll, E. R., Wallace, M. E., and Hull, F. E., Serum Levels of Penicillin in Domestic Animals. Ky. Agr. Exp. Sta. Bul. 549 (May), 1950.

3. Doll, E. R., Wallace, M. E., and Hull, F. E., Serum Levels of Streptomycin in Horses and Sheep. Ky. Agr. Exp. Sta. Bul. 548 (May), 1950.

4. Doll, E. R., Wallace, M. E., and McCollum, W. H., Serum Levels of Horses Following Intramuscular Injection of Aqueous Suspension of Procaine Penicillin. *Vet. Med.*, 45:309 (Aug.), 1950.

5. McCollum, W. H., and Doll, E. R., Serum Levels of Aureomycin in Foals. *Vet. Med.*, 46:84 (Mar.), 1951.

6. Doll, E. R., The Treatment of Septicemia of Newborn Foals with Streptomycin and Penicillin. *Cornell Vet.*, 39:86 (Jan.), 1949.

7. Doll, E. R., and Hull, F. E., Treatment of Septicemic Infections of Foals. *Jour. Am. Vet. Med. Assn.*, 114:370 (May), 1950.

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Eaton, of England, believes repeated intravenous injections of hexamine (urotropin) with antitoxin to be the most rational treatment for tetanus in horses.—*Vet. Rec.*, 63:59 (Jan. 27), 1951.

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Research continues to demonstrate that the virus of equine infectious anemia (swamp fever) is a peculiarly equine entity; not disease-exciting for other mammalian, or avian hosts. It makes diagnosis difficult in that the usual small laboratory animals cannot be used to distinguish this virus.

▼ ▼ ▼

Recently published results of research in England indicate that acute lead poisoning in ruminants is likely to result following the ingestion of from 0.2 to 0.4 gm. per kg. of body weight. However, after four months of age, relatively larger doses are required. Slight temperature elevation, gradually increasing anorexia, and decreased water intake were outstanding symptoms. On the other hand, chronic lead poisoning is said to be exceedingly rare in ruminants because in these animals there does not appear to be any cumulative action as does occur in man. For ruminants, "continued daily ingestion of lead in the very substantial dose of 8 mg. per kg. of body weight may be tolerated for months, and a level of 6 mg. per kg. of body weight per day may be tolerated for even three years." It is hinted that in pregnant ewes in poor condition, abortion may follow the ingestion of much smaller amounts.

A Rapid Test For The Diagnosis Of *Dirofilaria Immitis*

GEORGE R. BURCH,* D.V.M., and HARRY E. BLAIR,* D.V.M., New Augusta, Indiana

THERE is definite need for an accurate, practical diagnostic procedure which will simplify routine testing for microfilaria of the dog heartworm, *Dirofilaria immitis*. Armistead[1] states that ten to 15 years ago, the parasite was confined mostly to coastal or swampy regions of the United States. Now dogs harboring heartworms are a feature of almost every practice in the country.

Brumley[2] lists three methods which may be used in finding the microfilaria: (1) The one most easily performed but least accurate is the examination of a drop of whole blood on a slide covered with a cover slip. The microfilaria are seen as writhing, snake-like forms making their way through the blood cells. This method, while convenient, has been shown to be much less accurate than other tests employed[3]. (2) A second method is the one described by Morris, Dishel and Green[4] and is as follows: Withdraw 1 cc. of blood from a vein and immediately add .5 cc. of a 2% acetic acid solution; mix thoroughly and centrifuge three to five minutes, decant the supernatant fluid and place a drop of the sediment on a slide, cover with a cover slip and examine under the microscope. The larvae are motionless as they are dead and appear as small, thin, fiber-like structures. (3) A third method is one described by Stubbs and Live,[5] in which a blood sample consisting of 2 to 3 cc. is collected and placed in a test tube. The blood is allowed to clot and the serum to separate. A drop of serum is removed with a medicine dropper or glass rod and placed on a slide with a cover slip over it. Microfilaria appear as transparent fiber-like structures as in the previously described test and may be motile or not depending on amount of time consumed in the procedure.

To be ideal, a diagnostic test for microfilaria should fulfill the following requirements:

1. Be easy to perform.
2. Have a high degree of sensitivity.
3. Concentrate microfilaria.
4. Leave the microfilaria alive and motile.

The test for the identification of microfilaria described in this paper has been designated for the purpose of brevity, filtest®. It is planned that the solution for conducting the test will be made available ready for use by practitioners. The results obtained with this solution and by methods outlined herein more completely fulfill requirements for a satisfactory procedure than others employed in our laboratories.

Test Procedure

The dogs for this study were selected at random and included both mongrel and pure-bred males and females. The ages varied from ten months to four years. The technic for testing was as follows: (For equipment see figure 1.)

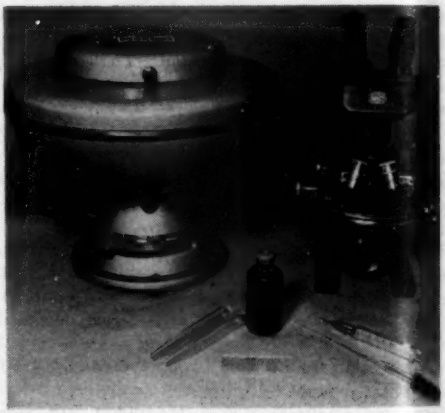

Fig. 1. Apparatus used with filtest technic.

1. Two cc. samples of venous blood were withdrawn from a leg vein into a 5 cc. glass syringe containing 1 cc. of filtest.
2. The syringe was then emptied into a centrifuge tube which was then vigorously agitated for 20-30 seconds to mix thoroughly.
3. The sample was centrifuged for one minute at 4,500 r.p.m.
4. The supernatant fluid was carefully removed from the tube with a medicine dropper or pipette and the last drop of fluid was placed on a slide and covered with a cover slip.
5. The slide was examined under low power magnification for presence of live microfilaria.

*Research Farm of Pitman-Moore Company, Division of Allied Laboratories, Inc., Indianapolis.

® Pitman-Moore Company, Indianapolis, Ind.

Eight (8.7%) dogs out of 91 were found to be harboring microfilaria and were used in a study to compare the efficacy of the new procedure with the commonly used whole blood smear method. The above described method was used with the filtest solution, and in addition, a drop of whole blood, from the same vein, was placed on a glass slide, covered with a cover slip and immediately examined under low power magnification. A standard examination procedure was used on all slides. (See fig. 2.)

TABLE 1. COMPARISON BETWEEN MICROFILARIA COUNTS USING WHOLE BLOOD AND FILTEST TECHNIC

Date	Dog No.	Whole Blood Count	Filtest Count
	1	0	14
	2	1	14
10/10/50	7	4	20
	8	4	23
8:30 a.m.	14	1	12
	17	3	12
	19	24	TNTC (too numerous
	25	3	61 to count)
	1	1	3
	2	2	6
10/11/50	7	2	85
	8	3	79
3:30 p.m.	14	0	9
	17	0	18
	19	9	TNTC
	25	9	157
	1	2	6
	2	0	5
10/12/50	7	0	27
	8	4	29
8:00 a.m.	14	0	7
	17	1	7
	19	10	117
	25	0	83
	1	0	6
	2	0	1
10/13/50	7	3	24
	8	4	5
8:00 a.m.	14	0	11
	17	1	21
	19	13	85
	25	4	51
	1	0	8
	2	1	4
10/17/50	7	5	12
	8	4	45
8:00 a.m.	14	3	8
	17	0	6
	19	28	TNTC
	25	5	92
	1	3	16
	2	0	6
10/18/50	7	7	53
	8	1	27
8:00 a.m.	14	0	9
	17	2	14
	19	9	TNTC
	25	1	41

Results

When the whole blood smears of infected dogs were examined, the microfilaria count was uniformly low and on numerous occasions no larvae forms were observed. In the 48 smears examined, 14 (29%) failed to exhibit evidence of microfilaria. In contrast, the filtest technic consistently revealed numerous live parasites and a positive finding was made in all tests. In only four out of 48 whole blood smears were ten or more microfilaria found, whereas, the filtest technic revealed ten or more in 32 out of 48 tests. (See table 1.)

Since the infected dogs in this series were tested morning and afternoon with equally good results, the need of nocturnal sampling is unnecessary to demonstrate the parasite. Neither is it necessary to inject epinephrine prior to taking blood samples.

Discussion

To demonstrate canine microfilaria easily, quickly and accurately, it is necessary to obtain a sufficient quantity of blood to be assured of finding the parasites even though they appear in limited numbers in an infected animal.

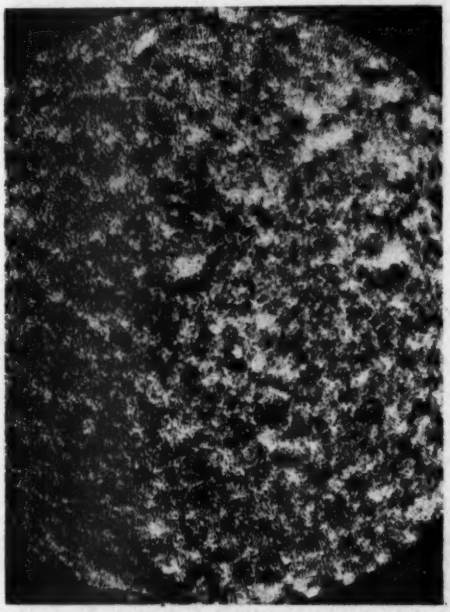

Fig. 2. Microphotograph of whole blood smear.

It is of further assistance to the technician to be able to observe clearly the movement of the live parasites on microscopic examination. The filtest solution used in this test in a ration of one part of the solution to two parts of venous blood (1 cc. to 2 cc.) successfully hemolyzed the red blood corpuscles, thereby allowing an unobstructed view of concentrated live microfilaria. (See fig. 3.) It is evident that with the commonly used whole blood smear, these hematozoon parasites cannot be observed easily due to the denseness of the red blood corpuscles. The fact that dogs known to be infected with microfilaria will give a negative diagnostic finding on direct whole blood smear is of marked significance since these filarial forms were always found in these same dogs using the methods now regularly employed by us.

By using this new test, the veterinarian can routinely draw blood samples for testing at regular office hours. This eliminates any need for nocturnal sampling; a procedure which has been used to increase the accuracy of the test.

The filtest solution exerts minimal toxic effects on the microfilaria following the mixing process. The technician can centrifuge and examine the specimen any time during the 24-hour period following collection if the test sample is kept at a temperature of approximately 70 F.

Fig. 3. Microphotograph showing live microfilaria using filtest technic. (Photograph not clear due to movement of parasitic larvae.)

Fig. 4. Microphotograph showing dead microfilaria (movement stopped by chilling).

Summary

1. A technic for examining peripheral blood for microfilaria by use of the solution named filtest is described.

2. Ninety-one dogs were tested with this solution for the purpose of diagnosing filarial infection and 8 (8.7%) positive cases were found.

3. The whole blood smear technic was employed in 48 tests made on dogs known to have microfilaria in the peripheral blood. In 14 (29%) instances, failure to demonstrate the parasite was recorded. Examinations on the same dogs at the same time using filtest solution were positive for microfilaria in every instance.

REFERENCES

1. Armistead, W. W., Heartworms. *Vet. Med.*, 45: 267 (July), 1950.

2. Brumley, O. V., A Textbook of the Diseases of the Small Domestic Animals, ed. 4, Philadelphia, Lea & Febiger, 1943.

3. Morris, Duhel, & Green, *N. Am. Vet.*, 16:11, 1935.

4. Morris, Duhel, & Green, *N. Am. Vet.*, 16:9, 1935.

5. Stubbs, and Live, *Trans. Royal Soc. Trop. Med. Hyg.*, 29:303, 1935.

Some Disease Problems In Young Pigs

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EVERY stillborn pig represents a loss of 130 lb. of sow feed. Every pig lost at weaning age means a loss of 240 lb. of feed. Add this loss of feed, to say nothing of labor, to the value of swine lost and the importance of curbing baby pig losses is readily seen.

Numerous factors contribute to the causes of stillborn, defective, or poor quality litters. These include sows with not enough teats; vitamin or mineral deprivation, or both, during gestation; gross feeding errors, as, for example, a heavy corn and low protein ration for sows in late gestation; poor farrowing house facilities; and plain carelessness.

Countless pigs are lost from crushing or overlying by sows because guard rails in farrowing pens are missing; dirty and poorly bedded farrowing pens mean a high incidence of pyogenic and fatal respiratory, intestinal and navel infections; especially where the fresh navel stumps are not dipped in iodine tincture. Chilling definitely precipitates the incidence of hypoglycemia or so-called "sleepers." If owners overlook dulling the needle-sharp teeth of baby pigs with a fine file, the penalty is usually a heavy crop of bite abscesses, stomatitis and facial necrobacillosis. If sows carry yard dirt and manure on their udders to the farrowing pens, damaging infections of ascarids and other intestinal parasites will occur in the young pigs. If recently farrowed pigs are confined on cement floors without access to the soil, heavy losses follow from iron-copper anemia. These factors are only a few of many things that can upset the pig raiser's production schedule. It will be noted also that almost all of these pig loss factors are preventable by good husbandry and the application of simple preventive procedures outlined by veterinarians.

Ear Marking

One of the most important precautions in avoiding baby pig and shote losses is to identify each litter with a distinct ear mark identical to the ear mark of the sow. If enteritis or some other contagious factor appears, the sows which serve as carriers and their infected litters can be picked out and isolated from others of the drove.

Agalactia

Agalactia in brood sows is a common and serious problem. It is usually caused by an excess carbohydrate and low level protein intake during late gestation. In simple agalactia the milk flow can often be started with 2.5 cc. of posterior pituitary extract and 2.5 cc. of anterior pituitary extract injected deep into the muscles, coupled with correction of the sow ration. Combined pituitary extract injection is also helpful in sows that show cannibalistic tendencies or that refuse to nurse newly farrowed pigs.

Agalactia and starved pigs are also observed because of so-called "milk fever." This is the farmer's name for mastitis of brood sows. It is best handled by the intramuscular injection of 4 cc. of posterior pituitary extract and 1,000,000 units of procaine penicillin in oil supplemented by rubbing camphorated oil on the mammae.

Pig Scours

Pig scours falls into two distinct types: dietary scouring and contagious scours or white diarrhea. In dietary scours, it is advisable either to cut down on the total quantity of sow feed or, if the ration is faulty, put sows on a half oats and shorts diet with 5% mixed proteins. Addition of a cup of blackstrap molasses to the sow ration also helps. As medication, an initial dose of 120 gr. of hexamethylenamine, either by balling gun or mixed with the feed is recommended. An additional 60 gr. dose is prescribed twice daily to effect. Or, if preferred, add 2 dr. of diluted formalin in milk to the sow's feed, twice daily. It is also good practice to provide lime water instead of plain water.

In handling an outbreak of contagious white scours, try to move unaffected sows and pigs to new quarters. The affected sows and litters should be placed in pens on clean bedding after the pens have been disinfected with hot lye water. All pigs should be given 15 cc. of

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5% glucose solution intraperitoneally. Then one of the preparations containing sulfonamides with kaolin and pectin should be dispensed, giving each pig a teaspoonful dose, twice daily. This is easy to give with a long nozzle oil can. Get the sows and pigs outside on clean pasture as soon as scouring is relieved.

Hypoglycemia

As previously stated, hypoglycemia of baby pigs can be prevented largely by avoidance of chilling and fasting. In cold weather, provide a triangular hood in the corner of the farrowing pen equipped with a 150-watt lamp bulb to provide heat for the pigs. The symptoms of hypoglycemia are refusal to nurse, shivering, dullness, and progressive coma. The most successful treatment is the intraperitoneal injection of 10 to 15 cc. of 5% glucose in saline, repeated at eight to 12 hour intervals. Many swine belt veterinarians leave the syringe and dextrose solution with the owner. Again, using the spring bottom oil can, affected litters are hand fed. The feeding formula is 1 qt. whole cow's milk with 2 oz. of added cream and 1 oz. of corn syrup. During the critical period, the pigs must be given 2 oz. of the formula at two-hour intervals day and night. Most of them can be put back on the sow in 12 to 24 hours.

Anemia and Pig Pellagra

The application of a sticky syrup to sow udders to prevent or treat suckling pig anemia is discouraged. It is better simply to dust the pens with a powder. A favorite method with many is to dispense ½ lb. of iron sulfate mixed with 2 oz. of copper sulfate, with instructions to mix this with 100 lb. of fine, clean sand which can be thrown into the pen; or, one can dispense tablets containing iron and copper for individual treatment.

Sometimes baby pigs are observed with greasy-feeling skins, sore mouths, poor vitality and mild scouring. This is the syndrome described by Breed as pig pellagra. It responds exceptionally well to a 2 cc. dose of parenteral vitamin B complex solution and the addition of 2 lb. of brewer's yeast per 100 lb. of ration for the sows.

Ascarids and Nodular Worms

Migrating ascarid larvae often cause thumping, coughing, and variable death losses from complicating pneumonia in suckling pigs. In these droves, move the pigs to clean ground, provide a creep containing pig meal or hulled oats with 30 gr. of phenothiazine per pig per day mixed in the creep feed. Mixed bacterin in 2 cc. doses at five-day intervals is favored to block off some of the pneumonia trouble. After weaning, pigs may be wormed with sodium fluoride (1 lb. to 99 lb. feed), giving as much medicated feed as they will clean up in 24 hours and discarding the balance.

Sometimes pigs on clean pastures will develop symptoms of a sustained diarrhea and subsequent mild anemia. Very few die, but the growth gain is faulty. Autopsy fails to show lesions of bacterial enteritis but if the slit and washed colon is held up to a light, hundreds or even thousands of bird-shot sized holes may be seen in the mucosa. This is typical nodular worm enteritis which responds promptly to phenothiazine medication.

Gastroenteritis

Probably the worst disaster that can hit any swine raiser is an outbreak of contagious, virus-borne gastroenteritis in baby pigs from

Numerous factors contribute to causes of baby pig losses. Proper management and adequate nutrition of the brood sow during gestation are of vital importance in production of large, husky litters.

three days to three weeks of age. It is a fulminating, fast-spreading malady resulting in almost total mortality. Repeated vomiting and profuse scouring are the predominant symptoms and one almost always sees some dullness and vomiting in the sows as well as the pigs. Autopsy of the pigs reveals a formed milk curd in the stomach, liquid, pasty and yellow-white bowel content, and gastroenteritis. The only assistance offered is the recommendation that clients report trouble early and move well sows and litters away from old quarters. Try to salvage pigs by dissolving a 250 mg. capsule of aureomycin in 30 cc. of water and giving 1 cc. intraperitoneally to pigs up to one week of age; 2 cc. to pigs two weeks of age; or 3 cc. to pigs three weeks of age. This is supplemented with peroral sulfonamides and 15 cc. intraperitoneal doses of 5% glucose solution. Do not expect too much from this or any other line of treatment for the losses are sure to be heavy no matter what is done.

Erysipelas and Cholera

On many of our Midwest farms, swine erysipelas causes losses among suckling pigs. One does not see too much joint swelling in baby pigs but "toe dancing," curled ears, red belly skin, red snouts, sudden deaths, and characteristic autopsy findings usually permit a conclusive diagnosis. Often the synovia of the joints has a pinkish tinge and carries flakes of exudate. Preventive vaccination with serum and live vaccine is the only practical control measure, as experience has shown us that serum alone will not do the job. Combined use of 10 cc. erysipelas serum and 100,000 units of procaine penicillin in oil will save and salvage a large majority of sick pigs.

Hog cholera prevention with serum and virus is swinging to pre-weaning vaccination; usually two weeks before weaning time or when the pigs are five to six weeks of age. The preferable serum dose for six-week-old pigs is 30 cc. with a full 2 cc. dose of virus. Many veterinarians are using increasing amounts of nonviable hog cholera vaccine, especially in areas where concurrent swine diseases enhance the risks of serum-virus overreactions. When using vaccine on pigs from immune sows, it is best to use it at or after weaning. One must also warn clients not to overlook annual revaccination of brood sows and boars.

This discussion has been limited to diseases of baby pigs. There are many diseases of shote age and adult swine which merit discussion. Among these are infectious enteritis, swine dysentery, parasitisms, brucellosis, swine erysipelas, disease control in feeder pigs, gut edema, dystrophic rhinitis, eperythrozoonosis, and many others.

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Report of Special Committee on Bovine Mastitis of the Illinois State Veterinary Medical Association*

The past year has seen no outstanding new treatments worthy of special recognition nor any radical departure from standard methods used in the treatment or control of bovine mastitis. Nothing has been brought to the attention of the Committee requiring any special action of the Association.

It is recognized that mastitis is one of the most costly diseases of the dairy industry and in as much as it is a preventable disease, the Committee would like to make recommendation and suggestions to members of the Association.

Tremendous sums of money have been spent by dairymen for drugs used in the treatment of mastitis through lay distribution channels. Most practitioners will agree that much of this money has been wasted and that known methods of treatment leave much to be desired. Treatment can only be effective if accompanied by a sound control program stressing sanitation, adequate housing facilities, and proper methods of milking.

Education of the client is still the key to the problem. The veterinary profession has a great responsibility in this educational program. Some of these dairymen must be taught that there is more to the treatment of mastitis than a trip to the drugstore for a widely advertised "cure-all." Unqualified, and at times, ridiculous claims for "wonder" drugs used for the treatment of mastitis have misled many dairymen into thinking they can abandon sanitation and accepted disease control procedures.

Veterinarians can do much by continually stressing sanitation and improved methods of milking and using diagnostic means that are available and prevailing upon clients to make greater use of laboratory diagnostic facilities, provided by the state, so that effective treatment can be started early. All should co-

(*Continued on page* 142)

*Presented at the 69th annual convention, Illinois State Veterinary Medical Association, Jan. 30-Feb. 1, 1950, Chicago.

Aureomycin Therapy In Acute Staphylococcal Mastitis

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THE effectiveness of aureomycin in an acute case of mastitis caused by hemolytic staphylococci has been reported by Easterbrooks[3]. McCullock, Kiser, and Migaki[4] have reported on the efficacy of this antibiotic in the treatment of chronic mastitis due to staphylococci. Packer[5] states that 34.3% success was obtained when 70 quarters infected with *Staph. aureus* were given one 200 mg. dose of aureomycin and that the organism was eliminated from 68.5% of 35 quarters given two treatments. This report presents the findings in an acute case of mastitis caused by staphylococci (*Micrococcus pyogenes* var. *aureus*, Bergey 6th ed.) successfully treated with aureomycin**.

History

First day. The subject was an eight-year-old Holstein in the third month of her sixth lactation period. A drop in the previous evening's milk flow of approximately five pounds had been noted. (See table 1.) On the morning of the day of examination the milk production was considerably less than normal. The right front and right rear quarters were swollen, reddish, hard, and painful, and the secretion from these quarters was thick and yellow. The rectal temperature was 101.5 F. Further general examination was essentially negative. Milk samples were drawn into sterile tubes with aseptic precautions and 200 mg. of aureomycin in an ointment base were infused into each quarter.

Second day. The udder showed no apparent changes, except a further decrease in milk flow. General examination revealed a rectal temperature of 105 F., anorexia, and extreme depression. Five grams of aureomycin hydrochloride with sodium glycinate in sterile distilled water were administered intravenously.

Third day. There was little change in the general condition of the animal except a slight drop in the rectal temperature.

Fourth day. The rectal temperature had decreased slightly, the animal had begun to eat, and the marked depression was no longer evident. Milk production was still low but the secretion had regained its normal appearance. Aureomycin was again infused into each quarter as was done on the first day of treatment.

Fifth day. The swelling in the right half of the udder had begun to subside, and the front and rear quarters of this half were no longer hard, red nor painful. The secretions appeared normal. The rectal temperature had dropped to 102.1 F. The general appearance of the animal was good.

Recovery from this point was uneventful. The milk production was back to slightly less than the preinfection level in three weeks. There was no damage to the glandular tissue that could be detected by physical examination.

Bacteriological

Incubated milk samples, obtained on the first day of examination prior to treatment, revealed staphylococci in all quarters and streptococci in one of the non-affected quarters; the left front. The Hotis test for all quarters was negative. Cultures of the staphylococci were obtained from all quarters and of the streptococcus in the left front by the use of blood agar plates. Additional study identified the latter culture as *Str. agalactiae*. The staphylococci from all quarters possessed identical characteristics. They were orange pigmented, hemolytic on ox-blood agar, coagulase and gelatinase positive, and grew well on a medium containing 7.5% sodium chloride (Difco, Staph. Med. no. 110). These characteristics are among those associated with pathogenicity of staphylococci.

Milk samples drawn on the eighth and 16th days, four and 12 days after the last treatment respectively, were negative for staphylococci and streptococci, both on examination of incubated milk samples and blood agar plates. Several subsequent milk examinations have also been negative.

*Virginia Agricultural Experiment Station, Department of Biology, Blacksburg.

**Furnished through the courtesy of Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y.

The *in vitro* sensitivity of the staphylococci isolated from the udder was determined by the serial dilution method described by Dornbush and Pelcak[2]. Complete inhibition of growth at 24 hours by an aureomycin concentration of 0.625 micrograms per ml. was obtained.

The levels of aureomycin in the composite milk sample and blood serum were determined by the serial dilution method described by McCullock, *et al.*[4] and Dornbush and Pelcak[1] on the third day. The samples for assay were taken with the ranges established by other workers and at this time were at a concentration sufficient for inhibition of the infecting organism as determined by *in vitro* tests. The streptococcus present in one quarter, not acutely involved, was also eradicated by the treatment used. The reason for the unilateral involvement of the udder in spite of the presence of staphylococci possessing identical characteristics in all quarters is not clear since there appeared no external predisposing factors.

TABLE 1. AUREOMYCIN IN ACUTE STAPHYLOCOCCAL MASTITIS

Day	Milk Prod. Lb. a.m.	p.m.	Temp.	Udder	Treatment
Avg. prod. before inf.	24.3	18.3	—	—	—
Day before infection	23.1	13.5	—	—	—
1*	10.7	8.2	101.8	RF, RR swollen, hard, red	200 mg./qtr.
2	6.2	4.8	105.2	Same	5 gm./intrav.
3	5.0	4.0	104.5	Same	—
4	6.0	6.5	104.0	Same	200 mg./qtr.
5	3.1	13.1	102.4	Swelling reduced, softer, nonpainful	—
6	14.0	9.7	102.1	Same	—
7	14.2	12.7	102.0	Nearly normal	—
8	17.0	11.6	101.8	Normal	—
20-33 Avg.	22.2	19.3	101.4	Normal	—

*First day of examination

24 hours after the intravenous injection of 5 gm. of aureomycin and 48 hours after the introduction of 200 mg. per quarter. These results were obtained: blood serum level, 1.0 microgram per ml.; whey, 20 micrograms per ml.

Discussion

The results of the use of aureomycin in the acute case of mastitis described caused by staphylococci indicate the usefulness of this antibiotic in certain cases and are in agreement with the findings of others[3]. The serum and whey levels of aureomycin determined 24 hours after the intravenous injection and 48 hours after the udder infusion agree for the most part

REFERENCES

1. Dornbush, A. C., and Pelcak, E. J., The Determination of Aureomycin in Serum and Other Body Fluids. *Ann. N. Y. Acad. Sci.*, 51:218, 1948.
2. Dornbush, A. C., and Pelcak, E. J., *In Vitro* Sensitivity of Various Organisms to Aureomycin. Mimeo. Rept. Lederle Lab. Div., Amer. Cyanamid Co., Pearl River, N. Y.
3. Easterbrooks, H. L., Intravenous Aureomycin Treatment in Acute Staphylococcic Mastitis. *Jour. Am. Vet. Med. Assn.*, 116:48, 1950.
4. McCullock, E. C., Kiser, J. S., and Migaki, H., Aureomycin in the Treatment of Staphylococcic Mastitis in Cows. *Vet Med.*, 44:253, 1949.
5. Packer, R. A., The Treatment of Chronic Bovine Mastitis with Aureomycin. *Vet. Med.*, 45:199, 1950.

It is estimated that 30,000,000 pigs will die in the United States this spring before reaching market weight.

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In a move to prevent black markets in meat, the Office of Price Stabilization (OPS) clamped controls on livestock slaughtering. All slaughterers, except farmers, are required to register with the OPS by March 15. Beginning April 1, each slaughterer will be given a quota of the number of animals he can use, based on his 1950 operations.—*Natl. Prov.*

Brucellosis in swine develops as a bacteremia. Disease process in this animal is similar to that in man. Recovery may be spontaneous in both.—*L. M. Hutchings, D.V.M.*

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Gestation, suckling and post-weaning periods in swine production are most exacting stages, from a nutritional standpoint.

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Flies have retained their acquired resistance to DDT after 30 generations, during which time none were exposed to this insecticide.

On The Blood Picture Of Sheep Exposed To The Medium Stomach Worms†

A. C. TODD.,* Ph.D., F. M. ARBOGAST,* M.S., Z. N. WYANT,* M.S., W. M. STONE,* M.S., and G. W. ELAM,* Lexington, Kentucky

TWO species of medium stomach worms, *Ostertagia circumcincta* and *O. trifurcata*, are near universal parasites of native Kentucky sheep. Ross and Gordon[1] summarized the report of Robertson[2] on sheep primarily affected by *O. circumcincta* in which the latter author indicated that fatal effects in Scotland were produced only in sheep carrying more than 8,000 of the worms. The description of the life history of *O. circumcincta* given by Threlkeld[3] would indicate that initial effects in the host are derived from migrations of the immature stages in the mucosa of the stomach and which result in petechial hemorrhages, gastritis, and nodule formation. These two species of Ostertagia are considered of rather great economic importance in western flocks in the United States and are, in fact, the so-called "western" stomach worms. Our studies lead us to conclude that the two Ostertagia species do not rank with the more important helminths of Kentucky sheep, *Haemonchus contortus, Moniezia expansa, Oesophagostomum columbianum,* and members of the genus Trichostrongylus. Their importance in this state apparently is derived from their presence as members of the aggregate infections characteristic of our sheep.

Neither *O. circumcincta* nor *O. trifurcata*, nor both, have been found as pure infections during postmortem examinations of lambs and sheep received for diagnosis by this department and in a survey of lambs processed by a packing plant in Lexington. The two species are invariably associated with more numerous specimens of *Haemonchus contortus*, the wireworm or so-called "eastern" stomach worm in the United States. The largest number of *O. circumcincta* and *O. trifurcata* found in the stomach and small intestine of a lamb graded "A" at the local packing plant, 1,605, was associated with 6,570 *H. contortus*. Because the females of the two Ostertagia species cannot be differentiated, it is necessary to record that the males of *O. circumcincta* are more numerous in our collections by a ratio of nearly 8:1.

The present indeterminate economic status of the medium stomach worms in Kentucky leads to three interesting considerations. The Kentucky market lamb industry rests in large part upon importation of yearling ewes from western areas, to be bred to purebred bucks which are predominantly Southdowns or Hampshires. It is apparent, therefore, that for the past 20 years, and in an accelerated process in the immediate past ten years, western stomach worms have also been imported into the state. The development of medium stomach worm infections in Kentucky has proceeded concurrently with adoption of systems of phenothiazine therapy. Periodic anthelmintic treatment is useful in improving condition of individual animals and, doubtless, can contribute to control of a given parasite by prevention of massive infections. Medium stomach

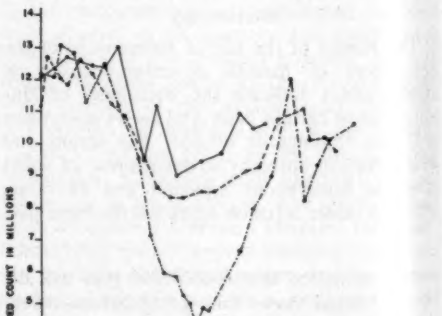

Fig. 1. Red cell counts of three yearling sheep exposed to 500 (————), 4,800 (— — —), and 48,000 (— . — .) infective larvae.

†The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

*Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington.

worm infections in Kentucky lambs, therefore, can be expected to increase in importance, or it can be considered that such infections are being held in check by a combination of anthelmintic treatment and feeding and management programs. Finally, it can be considered that the two Ostertagia and Kentucky sheep have reached a desirable state of mutual adjustment.

The above last consideration is being used as a point of departure for investigations on the adjustment between hosts and their parasites. It is obvious that the majority of our food-producing animals reach such mutual adjustments with their helminths during their individual lifetimes because the majority of helminth infections remain sub-clinical in nature. Sub-clinical parasitism is of greater economic importance than clinical parasitism because it is more widespread. The present paper is written to present the pattern of host reaction obtained by studying the blood pictures of yearling sheep and lambs given single exposures to infective larvae of *O. circumcincta* and *O. trifurcata*. The exposures were permitted to follow their natural courses and were not interrupted by anthelmintic treatments.

Materials and Methods

All of the sheep and lambs used in these experiments were animals which had been hand-reared on cow's milk. They were placed in elevated pens with iron grate floorings at birth. After weaning, they were fed good quality alfalfa hay supplemented by a daily quarter pound of calf starter. They were fed and watered twice daily during the course of the experiments. The yearling sheep observed were by a purebred Hampshire buck out of black-face native ewes. The lambs employed were by a purebred Cheviot buck out of the same black-face ewes.

Infective Ostertagia larvae, both *O. circumcincta* and *O. trifurcata,* were obtained from Baerman funnels which contained feces of one yearling previously exposed to the two species. The cultures were prepared and maintained according to the excellent procedure devised by Cauthen[4].

The following procedures were used in the collection and analysis of blood from the exposed sheep: Five cubic centimeters of blood were collected from the jugular vein. The bleeding tubes contained enough ammonium and potassium oxalate mixture, 1.3 mg. ammonium and 0.7 mg. potassium to make a concentration of 2 mg./ml. of blood. A drop of blood from the bleeding needle was used

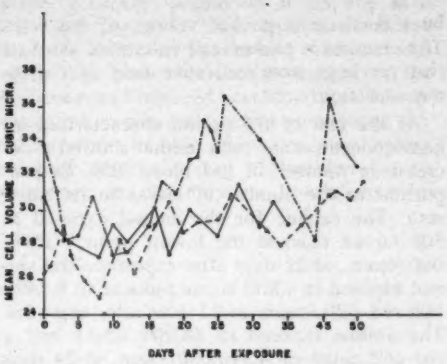

Fig. 2. Mean volume of red cells of three yearling sheep exposed to 500 (———), 4,800 (— — —), and 48,000 (— . — .) infective larvae.

to make smears for the differential white cell counts. Differential white cell counts were based on 200 cells. Hemoglobin concentrations were measured by means of a Fisher Electro-Hemometer and recorded as gm./100 ml. blood. Wintrobe's hematocrit tubes were used for packed cell volume determinations. Each hematocrit tube was centrifuged for one hour at not less than 3,000 r.p.m.; each tube had an end radius of 19 cm. on the centrifuge. The duplicate red and white cell counts were done with Spencer bright-line hemocytometers. The duplicate red cell counts were averaged and had to be within 500,000 cells/cmm. The duplicate white cell counts were averaged and had to be within 1,000 cells/cmm.

Observational Data

Yearlings. The hematological changes which occurred in the three yearling sheep selected for this report, following exposure to 500, 4,800, and 48,000 infective larvae, respectively, of the two stomach worms, are shown in part in fig. 1 and 2. Each of the three animals responded to exposure by an apparent hemoconcentration of at least seven days' duration. The yearling exposed to 500 larvae increased its red cell count by almost 1,000,000 in the first 12 days after exposure. The yearling exposed to 4,800 larvae increased its count by 1,500,000 cells at the end of 24 hours after exposure. The yearling exposed to 48,000 larvae increased its red cell count by nearly a million cells. Drops to levels markedly below the pre-exposure counts were first recorded for the three animals after intervals of 12, 13, and 12 days, respectively. (Fig. 1.)

The period of hemoconcentration in the animal exposed to 48,000 larvae was accompanied

by a decrease in packed volume of red cells. The changes in packed cell volume of the first two yearlings were indicative only of day-to-day variation.

At the end of the period characterized by hemoconcentration, each animal showed a decrease in number of red blood cells, in proportion to the number of larvae in its exposure. The decline for the animal exposed to 500 larvae reached the lowest point, 9,000,000/cmm., at 21 days after exposure. The animal exposed to 4,800 larvae reduced to 8,340,000 red cells/cmm. at 22 days after exposure. The animal exposed to 48,000 larvae had a red cell count of 4,310,000/cmm. at 24 days after exposure. These declines in red cell numbers were also accompanied by decrease in

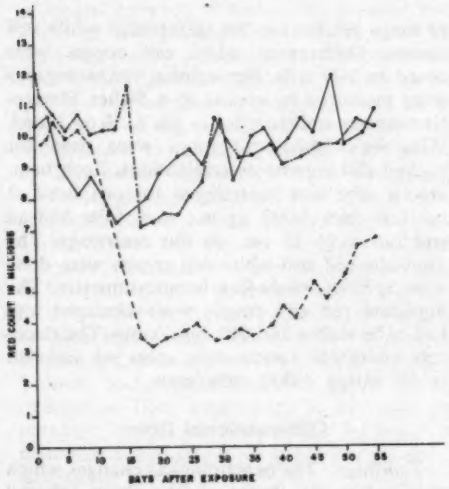

Fig. 3. Red cell counts of two, month-old lambs exposed to 300 (————) and 6,400 (— — —) infective larvae, and of five-month-old lamb exposed to 6,400 (— . — .) infective larvae.

their hemoglobin content and packed volumes. Conversely, the mean cell volume, expressed in cubic micra in fig. 2, increased in direct contrast to the decrease in red cell numbers. The increase in mean cell volume is particularly striking in the yearling exposed to 48,000 larvae when compared with the other two yearlings exposed to only 500 or 4,800 larvae.

A color index was prepared for each animal (fig. 5) and was based on the amount of hemoglobin and red cell count of each animal at zero days' exposure. The precedent for this device is given by Fourie[6]. At 21 days after exposure the yearling exposed to 500 larvae had a color index of 0.98. The yearling exposed to 4,800 larvae had an index of 1.14 at 22 days after exposure. The yearling exposed to 48,000 larvae had an index of 1.30 at 24 days after exposure. These data are of interest because they are also an inverse reflection of the decrease in red cell counts in the three animals.

The return of the various blood values to levels approaching those previous to exposure began in each yearling at intervals associated with maturity of the worms as determined by numbers of eggs passed in feces of the animals. An increase in red cell count was accompanied by increases in amounts of hemoglobin and the packed cell volumes, and by decreases in mean cell volumes and color indices. The total period of observation of each sheep is shown in fig. 1 and 2.

Lambs. Two of the three lambs selected for this report were exposed to infection when less than a month of age. The third lamb was first exposed at five months of age. The first two lambs were exposed to 300 and 6,400 larvae, respectively; the third lamb also received 6,400 larvae. Their hematological changes are in part recorded in fig. 3 and 4.

Two of the three lambs, those less than a month of age, responded to their exposures by temporary hemoconcentration, accompanied by a decrease in mean volume of their red cells. The five-month-old lamb initiated a drop in red cell count, accompanied by an increase in mean cell volume. By 13, 17, and 19 days after exposure, however, each lamb reached its lowest red cell count. These decreases in red cell numbers were accompanied by decreases in amounts of hemoglobin and packed cell volumes. For example, at zero days' exposure the month-old-lamb given 300 larvae had a red cell count of 10,380,000/cmm., a packed cell percentage of 39.6, and a hemoglobin level of 11.7 gm. At 13 days after exposure the same animal had a red cell count of 7,220,000/cmm., a packed cell percentage of 28, and 8.1 gm. hemoglobin (fig. 3). At one day after exposure the month-old lamb given 6,400 larvae had a red cell count of 9,790,000/cmm., a packed cell volume of 34, and 9.6 gm. hemoglobin. By 19 days after exposure the same lamb had a red cell count of 3,210,000/cmm., a packed cell volume of 19.8, and 5.6 gm. hemoglobin (fig. 3). These drops apparently were related to the number of larvae received by each lamb and by its age at exposure. The month-old lamb given 6,400 larvae dropped farther than the month-old lamb given 300 larvae, and dropped farther than the five-month-old lamb given 6,400 larvae (fig. 3).

The data on mean cell volumes in cubic micra of each lamb are shown in fig. 4. They mirror exactly the decrease in red cell count. For example, at one day after exposure the month-old lamb given 6,400 larvae had a red cell count of 9,790,000/cmm.; its mean cell volume in cubic micra was 34.72. By 19 days after exposure when the red cell count was 3,210,000/cmm., the mean cell volume was 61.68 cubic micra. Similarly, when color indices were prepared for each lamb, the color index rose in company with the mean cell volume. At 17 and 19 days after exposure the five-month-old lamb and the month-old lamb given 6,400 larvae had color indices of 1.72 and 1.78, respectively. The color indices prepared for each lamb and yearling sheep are shown in fig. 5.

The return of the various blood values to levels approaching those previous to exposure began in each lamb at intervals associated with first appearance of Ostertagia eggs in their feces. Ova first appeared in feces of the lambs at 21-24 days after exposure. Increases in red cell numbers were accompanied by increases in hemoglobin and packed cell volumes, and by decreases in the color indices and mean cell volumes. The total period of observation of each lamb is shown in fig. 3 and 4.

Discussion

These present data were obtained in order to illustrate the hematological changes in sheep and lambs undergoing their first infection with the two medium stomach worms, *Ostertagia circumcincta* and *O. trifurcata*. In other such studies the hemoglobin content and packed cell volumes generally have been graphed, but have not been given in the present paper. It is obvious that hemoglobin content and packed cell volumes generally closely follow red cell numbers; color indices are more reliable. Graphs of numbers and kinds of white cells have not been presented here. An eosinophilia of 25% and more occurred in only one animal, the yearling exposed to 48,000 larvae and was first definitely established at 36 days after exposure. It was found to persist for 16 days. An eosinophilia, or indeed a general leukocytosis, was not found to occur in the interval after exposure of the sheep and lambs and before the worms matured.

The present single infections appear to furnish a clearer insight into host reaction following exposure than can be obtained when animals are given multiple exposures in a restricted interval of time. The first reaction following exposure, hemoconcentration, occurred, generally, within 48 hours and at a time when Threlkeld[4,5] has reported the larvae still to be within the rumen and reticulum and before they have entered the mucosa of the abomasum and initiated host blood loss. Hemoconcentration can occur when an exposed animal interrupts its food and water consumption and may offer a partial explanation for its occurrence in our animals. Fourie[6] has reported atrophy of the spleen in fatal cases of haemonchosis. Interruption of normal splenic function is indicated in our sheep from the abrupt increase in red cell count and a similar abrupt decrease in mean red cell volume. The duration of the hemoconcentration, which we hesitate to term erythrocytosis in the first 48 hours after exposure, was dependent upon the age of the animal when exposed and upon the number of larvae constituting the exposure. Hemoconcentration persisted longer in our yearling sheep than in the lambs. (Fig. 1, 3).

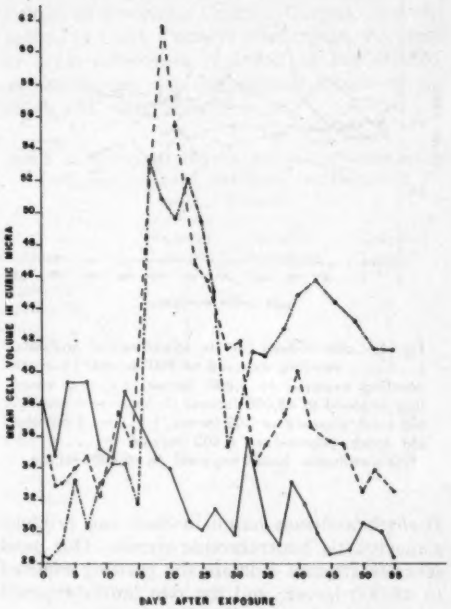

Fig. 4. Mean volume of red cells of two, month-old lambs exposed to 300 (———) and 6,400 (— — —) infective larvae, and of five-month-old lamb exposed to 6,400 (— . — .) infective larvae.

The second development in the blood picture, progressive anemia, is also of considerable interest in our animals. The anemia resulting from intestinal parasitism, except for the broad or fish tapeworm in man, is widely held to be microcytic and hypochromic[7].

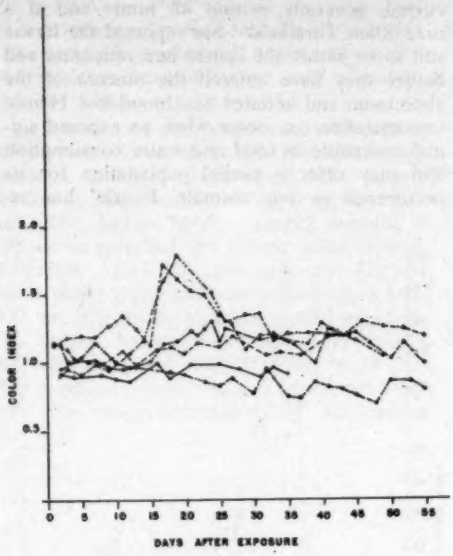

Fig. 5. Color indices for six experimental animals: (———) yearling exposed to 500 larvae, (— — —) yearling exposed to 4,800 larvae, (— . — .) yearling exposed to 48,000 larvae, (— — . — —.) month-old lamb exposed to 300 larvae, (— . . — . .) month-old lamb exposed to 6,400 larvae, (— . . . — . . .) five-month-old lamb exposed to 6,400 larvae.

Diphyllobothrium latum in man can produce a macrocytic hyperchromic anemia. Our most severely affected animals, the yearling exposed to 48,000 larvae, and the two lambs exposed to 6,400 larvae, developed hyperchromic anemias; they had color indices of 1.30, 1.78, and 1.72. At the same time the mean volume of the red cells of these three animals expressed in cubic micra increased from 33.82 to 36.53 for the yearling and from 34.72 to 61.68 and from 28.42 to 53.29 for the two lambs. The first anemia characteristic of our severely affected animals, therefore, was a macrocytic hyperchromic anemia.

In general, the recovery periods in the blood pictures coincided with the first appearance of Ostertagia eggs in feces of the animals. First eggs were passed by the lambs at 21-24 days after exposure; eggs were first passed by the yearlings at 30-35 days after exposure. The most severely affected yearling had eggs in its feces for only six days and had a high count of 248 eggs per gram (e.p.g.). This yearling had been exposed to 48,000 larvae. The yearling exposed to 4,800 larvae passed eggs for a period of over three months and its highest egg count was 608 e.p.g.

Increases in red cell counts were accompanied by persistent decreases in mean cell volume and color indices. The lamb exposed to 300 larvae had a color index of 0.79 at 55 days after exposure. The yearling exposed to 500 larvae had a color index of 0.92 at 35 days after exposure. Both of these animals had color indices consistently below 1.0 for the periods in which they were under observation. The lamb certainly could be said to have bordered on microcytic hypochromic anemia. The three animals which had exhibited macrocytic hyperchromic anemia progressed in recovery toward, but did not terminate in, microcytic hypochromic anemia. The five-month-old lamb had a color index of 1.19 at 55 days after exposure. The month-old lamb exposed to 6,400 larvae had a color index of 0.98 at 55 days after exposure and at 104 days after exposure had an index of 0.87. The yearling exposed to 48,000 larvae had a color index of 0.93 at 88 days after exposure while the yearling exposed to 4,800 larvae had an index of 1.05 at 89 days after exposure. It appears from our data that the type of anemia resulting from exposure to medium stomach worms is dependent upon the number of larvae constituting the exposure. A macrocytic hyperchromic anemia is the characteristic result of large exposures and during the interval when the immature worms are establishing themselves in their host.

It is concluded that the sheep and lambs were most severely affected by *O. circumcincta* and *O. trifurcata* during the interval after exposure to infection and before maturity of the parasites.

Summary

A pattern of sheep and lamb reaction to exposure to the two medium stomach worms, *Ostertagia circumcincta* and *O. trifurcata*, has been established. The immediate reaction to heavy exposures is hemoconcentration of a duration dependent upon age of the host. As the infections proceed, macrocytic hyperchromic anemia can occur. Recovery following exposure occurs in an interval closely associated with maturity of the parasites. Microcytic hypochromic anemia may tend to occur in the recovery period.

REFERENCES

1. Ross, I. C., and Gordon H. McL., Internal Parasites and Parasitic Diseases of Sheep. Sydney, Australia, Angus and Robertson, Ltd., 1936.

(*Continued on page* 142)

Anthrax In Livestock During 1950

C. D. STEIN,* V.M.D., Washington, D. C.

IN a previous report[1] the author presented statistical data on the incidence of anthrax in livestock from 1945 to 1949 inclusive. He pointed out that during this five-year period 597 anthrax outbreaks had been reported from 32 states with estimated losses of 7,909 head of livestock. Outbreaks in new areas were reported from 49 counties in 14 states. Two widespread virulent outbreaks occurred in Louisiana and sharp outbreaks in at least nine other states.

The data in the present report, as in previous ones, are based principally on information furnished by Bureau inspectors in charge of field work in various states after consultation with the state livestock sanitary officials. Although not 100% accurate, these data give a comprehensive picture of the national incidence of the disease in livestock for 1950.

Table 1 shows the states reporting outbreaks in livestock in 1950 with data on the incidence of the disease. Table 2 gives comparable data for the six-year period 1945 to 1950.

The data compiled from the 1950 survey indicate that during the year, 61 anthrax outbreaks in livestock were reported from 12 states involving 55 counties, with an estimated loss of 595 head of livestock. It is apparent from table 2 that 1950 was decidedly not an anthrax year as there were fewer outbreaks than in any years from 1945 through 1949. No major widespread outbreaks were reported during the year.

Most of the outbreaks reported were sporadic, resulting in minor losses and occurring on farms in known infected areas where owners had neglected to vaccinate. The greatest losses of livestock from anthrax were reported from infected areas in Louisiana, Texas, and California, where the estimated total losses were at least 554 head. Virtually all the outbreaks reported occurred in cattle. California was the only state that reported outbreaks in sheep. In an outbreak in this state involving 1,250 head of sheep, 41 were reported to have died from anthrax. Outbreaks in swine were reported from California and Iowa, and a loss of 35 horses from anthrax was reported in Texas. The appearance of the disease in one animal in Josephine County, Oregon, and one animal in Clark County, Washington, occurred in areas heretofore regarded as noninfected, as the Bureau has no previous record of the disease in these counties.

TABLE 1. STATES REPORTING ANTHRAX OUTBREAKS IN LIVESTOCK IN 1950 AND DATA ON INCIDENCE OF THE DISEASE

State	Number Counties	Number Outbreaks	Livestock Losses*
Alabama	2	2	6
California	11	14	83
Iowa	1	1	4
Louisiana	13	13	342
Mississippi	3	3	10
Nebraska	1	1	1
Nevada	4	7	7
New York	2	2	3
Oregon	1	1	1
South Dakota	7	7	8**
Texas	9	9	129**
Washington	1	1	1
Totals 12	55	61	595

* Includes cattle, horses, sheep, and swine.
** Losses estimated.

Records of the Federal Meat Inspection Division indicate that during the calendar year 1950, at establishments operating under federal meat inspection, 13 hog carcasses and one cattle carcass were condemned for anthrax (including spore vaccine lesions).

During the year two cases of agricultural anthrax in man were reported to the Bureau. One case in California occurred in a ranch owner after he had skinned a ewe found dead on an infected ranch. The second case was in an agricultural worker and occurred during an outbreak in cattle in Texas.

Seven cases of anthrax of industrial origin in man were reported in New Jersey. Two cases occurred in persons employed in the hide industry and five cases in workers in the wool industry.

Records of the U. S. Public Health Service[2] from January 1 to September 30, 1950, covering reports on notifiable diseases for the three quarters of the year, list 37 cases of

*Pathological Division, Bureau of Animal Industry, Agricultural Research Administration, U. S. Department of Agriculture.

anthrax in man. Of these 30 were reported from the New England States, New York, New Jersey, Pennsylvania, and Delaware, an area where the majority of cases of industrial origin usually occur.

TABLE 2. COMPARATIVE INCIDENCE OF ANTHRAX IN LIVESTOCK FROM 1945 TO 1950, INCLUSIVE

Year	Number States Reporting	Number Counties	Number Outbreaks	Livestock Losses*
1945	14	52	97	583
1946	18	82	163	4,019**
1947	19	65	124	880
1948	14	63	120	1,654**
1949	16	57	93	773
1950	12	55	61	595

* In some states losses were estimated.
** Heavy losses were reported during severe epizootics of the disease in Louisiana.

Summary

Results of a national survey to determine the incidence of anthrax in livestock for 1950 reveal that 61 anthrax outbreaks in livestock were reported from 12 states involving 55 counties with an estimated loss of 595 animals.

Most of the outbreaks were sporadic, involving small losses of livestock and occurring in infected areas where owners had failed to vaccinate their livestock against anthrax.

Outbreaks in new areas were reported from Oregon and Washington.

REFERENCES

1. Stein, C. D., Anthrax in Livestock During 1949 and Incidence of the Disease from 1945 to 1949. *Vet. Med.*, 45:205, (May), 1950.
2. *U. S. Public Health Reports*, 65:23 (June 9), 1950; 65:36 (Sept. 8), 1950; 65:52 (Dec. 29), 1950.

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On the Blood Picture of Sheep Exposed to the Medium Stomach Worm

(*Continued from page* 140)

2. Robertson, D. *Scot. Jour. Agr.*, 1933.
3. Threlkeld, W. L., The Life History of *Ostertagia circumcincta*. Va. Agr. Exp. Sta. Bul., 52, 1934.
4. Cauthen, G. E., A Method of Culturing Large Numbers of *Haemonchus contortus* Larvae from Eggs in Cattle Feces. *Proc. Helm. Soc. Wash.*, 7:82, 1940.
5. Threlkeld, W. L. and Downing, T. O., A Report on Experimental Infections of *Ovis aries* with the Infective Larvae of *Ostertagia circumcincta*. *Jour. Parasit.*, 22:187, 1936.
6. Fourie, P. J. J., The Hematology and Pathology of Haemonchosis in Sheep. Seventeenth Report Dir. Vet. Ser. and An. Ind., Union of South Africa, pp. 495-572. 1931.
7. Kracke, R. R., Diseases of the Blood, ed. 2, Philadelphia, J. B. Lippincott Co., 672 p., 1941.

Report of Special Committee on Bovine Mastitis

(*Continued from page* 133)

operate in every way possible with state veterinary extension and dairy extension services in this program of education.

One factor oftentime overlooked is the improper use and care of the milking machine. In this age of high labor costs, the milking machine is an absolute necessity on most dairy farms. Practitioners should acquaint themselves with the mechanism and proper use of these machines without prejudice to make or type. It is felt that most of the milking machines now on the market do a satisfactory job if the owners have been properly instructed as to their use and care and if satisfactory service is available. We should not hesitate, in any of the herds of our clients in which we are experiencing trouble with mastitis, to call for a serviceman from the milking machine company for a complete checkup of the equipment in all its parts; a factor frequently neglected. Apparatus in poor repair, with worn inflations and pulsators and uneven vacuum, is certainly conducive to mastitis. Manufacturers and distributors share a responsibility to see that their customers, who are clients, receive proper instruction as to the care and use of milking machines and that they supply adequately trained servicemen to look after them.

Veterinarians are best qualified to handle the problem of mastitis. Training, knowledge, and the facilities are available not only to successfully treat, but to prevent and control this number one disease of dairy herds. The druggist and remedy peddler can offer only a treatment. Emphasis should always be on prevention and control; treatment is secondary. The objective is as always healthy, profitable livestock, free from disease. — *H. P. Wessels, D.V.M., chairman.*

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Control of animal disease is dependent on:

1. Accurate diagnosis.

2. Identification or recognition of the infectious agent.

3. Proper management to protect the susceptible host.

4. Provision for protection of the susceptible by immunization.

5. Ability to treat the infected individual successfully.

Hormones In Veterinary Medicine

RUDOLPH SEIDEN,* Ch.E., F.A.I.C., and JOHN L. WELLS,** D.V.M., Kansas City, Missouri

HORMONE therapy is highly complex because of the interrelationship of secretions of ductless glands. An attempt is made in this review of the progress made in hormone therapy during the last decade to outline proved and accepted theories, and to omit claims and ideas which are not now accepted by leading authorities in the field of endocrinology.

Among the glands of the body are those called ductless or endocrine. They secrete organic substances known as hormones or endocrines, which are emptied directly into blood vessels and transported in the blood stream, producing a specific effect on remote organs before being eliminated from the system. Each endocrine gland secretes one or more hormones in minute quantities, as needed, through either nervous impulse or direct action of an endocrine secreted by another gland.

In the normal body, endocrine secretions are delicately balanced; excessive or deficient secretions of any endocrine gland may lead to disease condition. On the other hand, the application of hormone therapy, and particularly of modern sex hormone therapy, has contributed considerably to progress in veterinary medicine in recent years. Chemically speaking, the endocrines are either proteohormones, such as those obtained from the pituitary gland; steroids of the C_{19} or C_{21} series, of which the so-called sex hormones, testosterone and estrogenic hormones, are examples; or derivatives of amino acids (epinephrine and thyroxine).

Among the endocrine glands and their hor-

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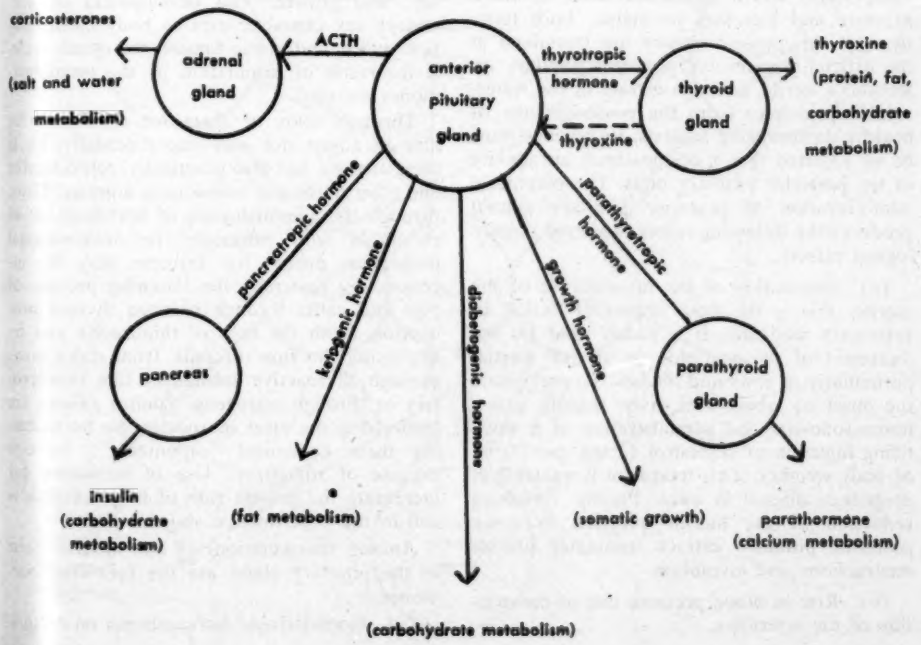
Interrelationship of Anterior Pituitary Hormones



mones are a few concerning which little is known as to their importance in veterinary medicine. This is particularly true of the following: (1) Thymus gland; it is well developed in the young, but degenerates gradually until the time of maturity. There is some indication that the hormone produced by this gland may cause offspring of successive generations to grow to maturity at a faster rate. (2) Pineal gland; its hormone may have some influence on the frequency of breeding. (3) Spleen, gallbladder, liver, heart, kidneys, and gastrointestinal tract; their secretions are still of doubtful status and, therefore, will not be considered here. This review shall be limited to a discussion of the hormones of the following seven endocrine glands, their chemism, examples of their practical importance in veterinary medicine, and some interesting interrelationships.

Pituitary Gland

The pituitary gland is unquestionably the master gland of the body. It is located at the base of the brain in a bony cavity and is composed of two parts, the small posterior lobe and the large anterior lobe.

I. *Secretion from the Posterior Lobe.* This consists of two active principles; oxytocin, which stimulates the uterus to contraction, and vasopressin, which induces a rise in blood pressure and increases peristalsis. Both functions of this proteohormone are contained in the official preparation, posterior pituitary injection, a sterile, aqueous extract of the water-soluble principles from the posterior lobe of healthy domesticated animals. Its potency must be so adjusted that 1 cc. possesses an activity of ten posterior pituitary units. The parenteral administration of posterior pituitary extract produces the following rather profound physiological effects:

(a) Stimulation of the musculature of the uterus; this is its most important action in veterinary medicine. It is widely used for the treatment of dystocia due to uterine inertia, particularly in sows and bitches. To precipitate the onset of labor, it is given usually a few hours following the administration of a sensitizing injection of stilbestrol (1 mg. per 20 lb. of body weight). This treatment is valuable in pregnancy disease in ewes. Finally, following reduction of the uterine eversion in cows, posterior pituitary extract stimulates uterine contractions and involution.

(b) Rise in blood pressure due to constriction of the arterioles.

(c) Antidiuretic and sometimes diuretic effects (unimportant in veterinary medicine).

(d) It is often suggested as a circulatory stimulant, especially to enhance the action of epinephrine or ephedrine in cases of surgical shock. It is also claimed to be helpful in certain cases of agalactia in recently farrowed sows.

(e) Disputed is the value of the vasopressin fraction for the increase of intestinal peristalsis, particularly of the upper part of the colon in horses[1].

The recommended dose of posterior pituitary injection is 5 to 10 cc. for cattle and horses; 3 to 5 cc. for sows and ewes; 1 to 3 cc. for bitches; and 0.5 to 1.5 cc. for cats. It is given intramuscularly or subcutaneously, except in sows, in which case it may be given intravenously or intraperitoneally.

II. *Secretion from the Anterior Lobe.* The anterior lobe of the pituitary gland dominates practically all other endocrine glands, and surely those discussed here. If it is removed, the other glands soon shrink and cease production. Injection of true, bio-assayed anterior pituitary hormones,[3] not aqueous extracts, the therapeutic value of which is officially questioned, soon restores atrophied glands (*e.g.*, the testes or ovaries) to produce increased amounts of their respective hormones. The anterior lobe regulates reproduction, metabolism, and growth. The development of secondary sex characteristics as body conformation, voice, and in the female, the estrus cycle, is the result of stimulation by the proteohormones secreted.

Through some of them we soon may be able to adjust not only experimentally, as is done already, but also practically, reproductive and other hormonal functions in animals. Thus, through the administration of hormones or of chemicals with hormonal or antihormonal properties, profits for farmers may be increased by hastening the fattening process of pigs and cattle through reduced thyroid production (with the help of thiouracil) and by increasing the flow of milk from dairy cows through thyroactive substances like thyroprotein or through estrogens. Poultry raisers are tenderizing the meat of roosters by hormonizing them (chemical "caponizing") through the use of stilbestrol[2]. Use of hormones for increasing the growth rate of large animals is still in the experimental stage[3].

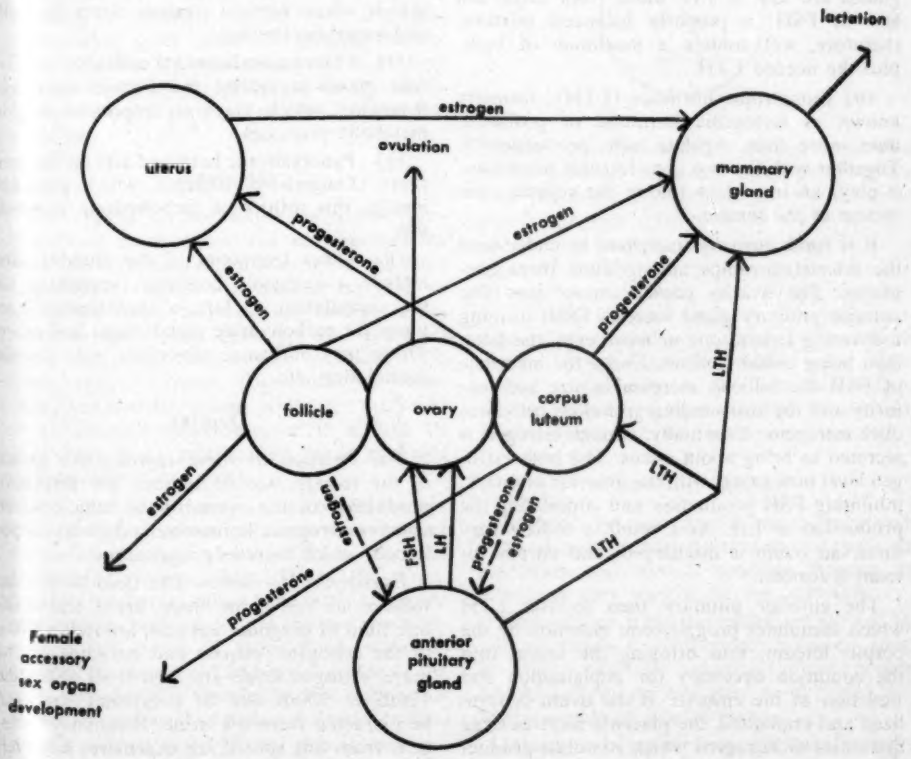
Among the secretions of the anterior lobe of the pituitary gland are the following hormones:

(a) Gonadotropic hormones act on the pri-

mary sex glands (ovaries and testes). They include the follicle-stimulating hormone (FSH) and the luteinizing hormone (LH), also called the interstitial-cell stimulating hormone (ICSH). In man and in higher monkeys there is found in the urine during pregnancy (PU) a substance having the biological properties of a mixture of FSH and LH, the latter being predominant. It is a product of the placenta and is known as chorionic gonadotropin, an anterior pituitary-like sex hormone which is expressed in international units (I.U.). In the mare, from about the 50th to 140th days of pregnancy, there occurs in the blood serum, but not in the urine, a gonadotropic hormone (designated as PMS) which is only follicle-stimulating in action. Both types of the above hormones, PU and PMS, also called pregnancy gonadotropins, are now being extracted from their respective sources commercially and are made available for therapeutic use in bio-assayed, lyophilized form.

From the many cases in which chorionic gonadotropin was used successfully, only a few can be cited here. It is noteworthy that the intravenous dose of this product is only a fraction of the intramuscular dose. According to one report, 24 cows with cystic ovaries and exhibiting symptoms of nymphomania were treated intramuscularly with 10,000 I.U. of chorionic gonadotropin (PU), which is considered a specific for these conditions; 21 of them recovered and later conceived. Six cows, with cysts, not showing symptoms of nymphomania were similarly treated, and five conceived on first service[4]. Eighteen cows with cystic ovaries received 1,000 I.U. of chorionic gonadotropin intravenously; in 12 cases nymphomania ceased within three to 11 days; two relapsed. These and the remaining six received second injections after which normal cycles were resumed in seven. Thus, of 17 cows benefited, 12 were known to have conceived[5]. Five of six mares in anestrus were treated twice (17

Anterior Pituitary and Female Sex Hormones



days apart) with 2,000 I.U. of PMS intramuscularly. Heat periods were induced and these conceived when bred[6]. Nineteen cows having regular heat periods but failing to conceive were treated with 2,500 I.U. chorionic gonadotropin intravenously; pregnancies were obtained in six animals[7]. Finally, three sexually inactive bulls producing sperm of low motility responded to this treatment.

In addition to chorionic gonadotropin (PU and PMS), a number of anterior pituitary extracts are on the market, prepared from glands of horses, cattle and sheep. However, the use of the old-established aqueous extracts, representing the water-soluble extractives from a given amount of fresh tissue, is now officially discouraged because there is no bio-assay available that can be depended upon to prove their composition and therapeutic value. Lyophilized, fractionated extracts of high efficiency, containing balanced amounts of FSH, LH, and luteotropic hormones (LTH), are preferred forms for the treatment of disorders of reproduction. Such products eliminate other hormone actions of the anterior pituitary, some of which may be disturbing. While the equine glands are low in LH, those from cattle are low in FSH; a properly balanced mixture, therefore, will contain a maximum of both, plus the needed LTH.

(b) Luteotropic hormone (LTH), formerly known as lactogenic hormone or prolactin, does more than regulate milk production[8-a]. Together with the two gonadotropic hormones, it plays an important role in the reproductive system of the female.

It is fundamentally important to understand the interrelationships among these three hormones. The ovaries contain many ova. The anterior pituitary gland secretes FSH, forming a covering around one or more eggs, the latter then being called follicles. Under the influence of FSH the follicles increase in size and maturity and the surrounding granulosa cells produce estrogens. Eventually, enough estrogen is secreted to bring about estrus. The high estrogen level now reacts with the anterior pituitary, inhibiting FSH production and stimulating the production of LH. As a result, a follicle ruptures, an ovum is discharged, and corpus luteum is formed.

The anterior pituitary then secretes LTH which stimulates progesterone secretion by the corpus luteum, thus bringing the uterus into the condition necessary for implantation and nutrition of the embryo. If the ovum is fertilized and implanted, the placenta secretes large quantities of estrogens which stimulate production of LTH; the latter prolongs the life of the corpus luteum and the production of progesterone prevents the onset of heat and keeps the uterine muscle from becoming active. However, if pregnancy does not occur, the corpus luteum ceases to function after a length of time that varies with the species. The anterior pituitary, thus temporarily released from ovarian control, again secretes FSH and the estrus cycle is renewed.

Anterior pituitary extracts were used intravenously in 96 cows with cystic ovaries. Nymphomanic symptoms disappeared in 72 animals after one injection and normal estrus was established in 69 after one injection[9]. Seven cases of anestrus, due to deep-seated retained corpora lutea, responded to two intramuscular injections of gonadotropic fractions spaced at three-day intervals[6].

(c) Growth hormone influences the growth of animals.

(d) Parathyrotropic hormone regulates the activity of the parathyroids in calcium metabolism.

(e) Adrenocorticotropic hormone (ACTH) influences the cortical portion of the adrenal glands whose cortical steroids direct the salt-and-water metabolism.

(f) Thyrotropic hormone activates the thyroid gland to secrete the thyroid hormone, thyroxine, which plays an important role in metabolic processes.

(g) Pancreatropic hormone acts on the pancreas (Langerhans' islands), which produces insulin; this influences carbohydrate metabolism.

(h) Other hormones of the anterior lobe include a ketogenic hormone, important for the assimilation of fats; a diabetogenic hormone for carbohydrate metabolism; and others which may influence digestion, *e.g.*, protein assimilation, etc.

Ovaries

The function of these reproductive glands of the female, two in number, are threefold; production of the ovum, of the follicle which secretes estrogenic hormones, and of the corpus luteum which secretes progesterone.

Estrogenic Hormones. The fluid of ovarian follicles, as well as the blood, urine, and amniotic fluid of pregnant animals, are rich sources of the estrogens, estrone and estradiol. In the mare, estrogen levels are high from about the 120th to 300th day of pregnancy and can be extracted from the urine. Pregnancy estrogens from this source are expensive; however,

many compounds which possess the hormonal properties of estrogens have been prepared by synthesis. Of these synthetic estrogens, by far the best known is stilbestrol, more correctly called diethylstilbestrol. The injection of 20 mg. of stilbestrol is much superior to any other treatment in cases of retained placenta in cattle. About 75% of the treated cows expel the fetal membranes within 36 hours[10]. It is reported that 25 mg. stilbestrol given intramuscularly will expel a mummified fetus in 40 to 128 hours,[11] and 60 to 80 mg. will cause regression of retained corpora lutea in cows in 14 to 21 days, so that normal estrus cycles are resumed[12]. A dose of 10 to 20 mg. stilbestrol usually stimulates normal estrus[13]. Stilbestrol was also used in 43 cases of pyometra. Thirty to 50 mg. were administered intramuscularly two weeks after manual removal of retained placenta. Of these animals, 98% proved fertile as compared to 86% fertility in 50 untreated controls[14]. Finally, 1 mg. stilbestrol orally given daily for three days, followed by 1 mg. every three days, is recommended for the treatment of prostatitis and urinary incontinency in bitches[15].

Progesterone. This hormone is available as a natural or synthetic product. Only if fertilization takes place does the growing corpus luteum secrete progesterone in increasing amounts; later on the placenta, too, produces this hormone. Its use in veterinary medicine is limited.

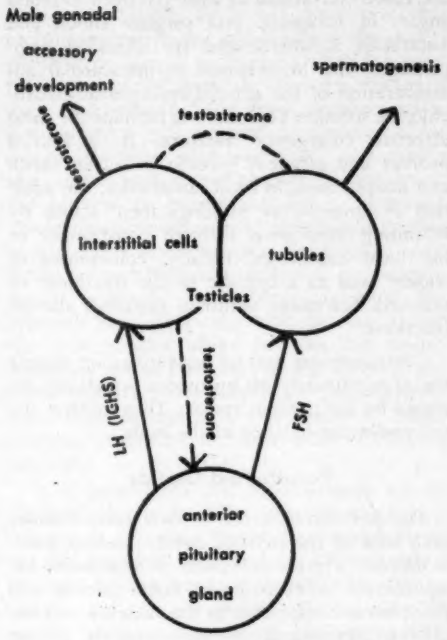
Testicles

The testicle has two major functions— production of spermatozoa and the secretion of male sex hormones called androgens, the most important of which are testosterone and its less active form, androsterone (which is excreted in the urine). Both are also prepared synthetically; they are soluble in alcohol and other organic solvents. Testosterone, a white, crystalline powder, is now preferably marketed in an aqueous suspension, or it is, like its derivatives (*e.g.*, propionate), made available in vegetable oil solutions.

The anterior pituitary of the male secretes the same gonadotropic hormones as that of the female. In the male, the FSH is necessary for spermatogenesis, while LH (ICHS) stimulates the interstitial cells of the testis to secrete testosterone. Bulls' testes are the best available commercial source of testosterone, which is essential to the growth and maintenance of the penis and accessory sex glands. It is responsible for the development of male sex characteristics.

It is claimed that 225 mg. testosterone implanted subcutaneously near the withers in racing geldings increases their performance. This treatment is repeated at two to three-month intervals[16]. Testosterone is also used for sexual impotency in dogs. For dogs weighing 30 to 35 lb., the dose is 25 mg. the first day, 10 mg. the second day, and 10 mg. the third day[17]. Four cases of impotency in bulls were successfully treated by injecting 100 mg. testosterone intramuscularly weekly for three weeks[18]. Interesting is the fact that singing can be restored in aged canaries by injecting small amounts of testosterone at intervals[19].

Anterior Pituitary and Male Sex Hormones



Adrenal Glands

Each of the two adrenal glands, located in front of each kidney, consists of two parts, the medullary and cortical portions. Among the hormones they secrete are the following:

Epinephrine from the medullary part of the adrenal glands, or synthetically prepared, forms a white, odorless, microcrystalline powder which darkens on exposure to the air. It is freely soluble in diluted acids.

Injections of epinephrine produce vasocon-

striction and cardiac acceleration resulting in transient rise in blood pressure, dilatation of the bronchi, relaxation of the stomach and intestine and contraction of the sphincters, and increased conversion of liver glycogen to blood sugar. In traumatic and surgical shock and anesthesia accidents, and for checking hemorrhages, the intravenous or intracardial administration of the official epinephrine hydrochloride solution (1:1,000) is perhaps the most effective emergency measure. It is also a prompt and efficient specific in serum shock and anaphylaxis. In local anesthetics, the addition of epinephrine prolongs their action by inhibiting absorption through constriction of the local capillaries. Finally, epinephrine is widely used as a specific in the treatment of urticaria, bee stings, antitoxin and other allergic reactions.

Corticosterone and its derivatives are among the approximately 30 hormones which are secreted by the adrenal cortex. They control the salt-and-water balance of the body.

Parathyroid Glands

The parathyroids, one or two located under each lobe of the thyroid gland, produce parathormone, a proteohormone. It maintains the equilibrium between the insoluble calcium and phosphorus compounds in the skeleton and the soluble compounds of the minerals in the blood.

Thyroid

This gland is stimulated by the pituitary to secrete the hormone thyroxine which is also prepared synthetically. It contains 65.36% iodine and forms white, odorless, needle-like crystals which are soluble in alkaline solutions. This hormone controls the metabolism of the body; goiter is an enlargement of the thyroid gland due to thyroxine insufficiency.

Pancreas

Located adjacent to the stomach, this gland secretes, in addition to digestive juices (which enter into the intestine), the proteohormone insulin which, as an endocrine, enters the blood stream. When secretion of insulin falls below the normal level, diabetes mellitus results.

REFERENCES

1. Veterinary Symposium No. 12, Haver-Glover Laboratories, 1950, p. 11.
2. Seiden, R., Poultry Handbook, New York, D. Van Nostrand Company, 1949, p. 345.
3. Purdue Univ., Dept. of Animal Husbandry, The Use of Hormones in Meat Animals, Mimeo A. H., 56, Dec. 18, 1950.
4. Deubler, *et al.*, Univ. Pa. Bul. Vet. Ext. Quart., No. 95, 1944.
5. Moore, G. R., Effects of Chorionic Gonadotropin on Cystic Ovaries in the Cow. *Vet. Med.*, 41:163 (May), 1946.
6. Stocking, G. G., *M.S.C. Vet.*, 6:164, 1947.
7. Bottomley, *et. al., Jour. Agr. Sci.*, 30:235, 1940.
8a. Harris, R. S., and Thimann, K. V., Vitamins and Hormones: Advances in Research and Applications, Vol. VII, New York, Academic Press, Inc., 1949, p. 254.
8. Casida, L. E., McShan, W. H., and Neyers, R. K., *Jour. An. Sci.*, 3:273, 1944.
9. Veterinary Symposium No. 12, Haver-Glover Laboratories, 1950, p. 10.
10. Conn, G. H., Stilbestrol in Dairy Practice. *N. Am. Vet.*, 25:349 (June), 1944.
11. Wright, J. G., The Clinical Application of Oestrogens and Gonadotropin. *The Middlesex Vet.*, 3:15 (Fall), 1943.
12. Moore, G. R., Effects of Stilbestrol on Pyometra Following Retained Fetal Membranes. *Jour. Am. Vet. Med. Assn.*, 108:153 (March), 1946.
13. Montgomerie, R. F., and Brownlee, Geo., The Treatment of Anoestrus in Domestic Animals with Stilbestrol Dipropionate. *The Vet. Rec.*, 53:567 (Sept. 27), 1941.
14. Moore, G. R., Effects of Stilbestrol in Retained Placenta. *Jour. Am. Vet. Med. Assn.*, 108:79 (Feb.), 1946.
15. Detweiler, D. K., *Univ. Pa. Bul. Vet. Ext. Quart.*, No. 98, 1945.
16. Kearns, W. M., Testosterone Pellet Implantation in the Gelding. *Jour. Am. Vet. Med. Assn.*, 100:197 (March), 1942.
17. Engle, J. B., and MacBrayer, R., Impotence in the Dog: Its Treatment with Male Hormone Substance. *Jour. Am. Vet. Med. Assn.*, 97:158 (August), 1940.
18. Durrell, W. B., *Canad. Jour. Comp. Med. Vet. Sci.*, 11:290 (Oct.), 1947.
19. Veterinary Symposium No. 12., Haver-Glover Laboratories, 1950, p. 13.

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Information from various reliable sources indicates that fly resistance to most of the present day insecticides is becoming noticeably marked. More and more, evidence is presented that the use of insecticides alone (DDT, lindane, chlordane, etc.) without the application of sanitary measures, will in a few years result in no protection against these pests. Veterinarians as sanitarians should continuously preach the proper disposal of breeding places such as manure piles, wet soggy grains and fodder accumulations, draining of pools and general cleanliness. To the foregoing, add insecticides as a supplementary measure.

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A blood sample serves well for tissue specimen for laboratory examination for anthrax. Care should be observed in collection and shipment of the sample.

EDITORIAL COMMENTS

"The Voice of Experience"

VETERINARY MEDICINE is the veterinary practitioner's journal; it belongs to him; it is being written and edited and published for him. The editors ever are mindful that the practitioner is a busy man, that his duties require many hours of every day. It is also appreciated that the practice of veterinary medicine is physically strenuous. At the end of a busy day there is little energy left for writing and too frequently, and unfortunately, less time for reading.

Who in the profession is better qualified than the practitioner to know what will interest and aid other veterinarians. Everyday problems are similar everywhere. In all professional literature of today, specialists, research men and college professors do much of writing that appears in the periodical journals. That is inherent in the stepped-up tempo of research. The most fruitful research would accomplish little if the results were not publicized. These articles are carefully prepared and well written. They contain material not available elsewhere and are valuable to the practitioner. Sometimes, however, the discussions are a bit ponderous — articles contain experimental protocols, exhaustive tables, etc. They are vital to the advance of the science of veterinary medicine; in fact, it is this work that has given the real impetus to progress in the treatment and control of animal maladies.

There must be, in addition to the researchers, hundreds of men who can supply valuable information for their confreres; whose reports would be read by all with both pleasure and profit. Those little differentiating details that assist in diagnosis and treatment make up a portion of the art of veterinary medicine. How often an idea that carries the weight of studious field observation is brought out from the floor at meetings! These things do not appear in the textbooks.

When asked to contribute a paper on a subject, many veterinarians hesitate. They visualize the difficulty of preparing technical material. Many excuse their failure to contribute to their professional duties—lack of time. These fear the time required for preparation, including report of laboratory studies, review of the literature on the subject, preparation of tables and a list of references. This is not what is wanted by so many. Rather, the homey, chatty type of copy that recounts those pertinent clinical observations that none but a practitioner can supply. Is it not quite true that such have contributed immensely to the understanding of disease problems and to the solution of many of them? It does not matter if these observations differ from previous training. Someone will support or question these things and from such exchange, both reader and writer gain immeasurably. Furthermore, the interest in everyday work is enhanced. Those practices considered simple and routine by some may open the gates for others. To do things more efficiently, followed by superior results, is helpful to all. None are static. Remember the fellow who said he had to run like hell to stay where he was. He simply meant all about him were going forward and if he stood still he would get behind. New ideas must be available continually to assure progress sufficient to cope with developing problems.

It is hoped that this little sermon will be accepted in the friendly spirit in which it is written. It is further hoped that more will see the advantages to them and the value to others of case reports, clinical observations, professional relations, etc. Such may be classified as the "voice of experience," and surely there is no more effective teacher.

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In this ultra-dynamic period in world history, we recognize rapid progress on practically all fronts. Veterinary science is a growing field of human endeavor; its subject matter, basic and applied, is enlarging, and more and more specialization is resulting as a necessary consequence.—*George H. Hart, Dean, Pa. Vet. Ext. Qrtly., No. 121.*

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In Sweden, according to the Swedish International Press Bureau, steps are now being taken jointly by dairymen and the Veterinary Board to ensure that penicillin is used only when really necessary, and that milk from treated cows is kept separate from the supply. —*Brit. Med. Jour.*

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Colombia, South America, has the highest ratio of cattle to human population of any country in the world. Cattle numbers are estimated at 14,500,000 head, hogs at 1,200,000 and sheep at over 1,000,000 head.—*Natl. Prov.*

Brucellosis in Chickens

Human infection by consumption of meat of Brucella-infected birds is possible in the light of experiments reported by Illinois workers. (*Jour. Vet. Res.*, 12:48 [Jan.], 1951.)

Implications of results of investigations have demonstrated that infection may be established in chicks by intramuscular and intraperitoneal injection of virulent Brucella organisms. Infection, as determined by blood agglutination tests and demonstrated bacteremia, also results from feeding cultures. Natural infection was shown in birds exposed to droppings of those artificially infected. From these observations it appears logical that avian brucellosis may be spread among the flock by infected birds, or transmitted to both hogs and cattle.

Significant was the response to cross agglutination trials with *Vibrio cholerae*, Proteus OX_{19}, and *Salmonella pullorum* antigens. The latter persisted longer than the agglutinins for Brucella. Furthermore, the strength of reactions was shown to vary more following inoculation with cultures of different virulence than the variation in response to different species.

The authors point out that meager pathologic signs of infection make it difficult, or even impossible, to detect all infected chickens during food inspection.

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A rinderpest vaccine study, conducted by the veterinary affairs division of the occupation government of Japan showed that indigenous black cattle are definitely more susceptible to untoward reaction to lapinized rinderpest vaccine than Holstein Friesian cattle. This study confirmed previous work of the Japanese from which it was concluded that the lapinized virus is not a suitable immunizing agent for the indigenous cattle of Japan.

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The primary objectives of the National Turkey Improvement Plan are to improve the production and market quality of turkeys and to reduce losses from disease. Through it, turkey breeding stock, hatching eggs, and poults may be identified, authoritatively, with respect to breeding quality and degree of freedom from pullorum disease. The application of the provisions of the plan should cause turkey production to be more efficient and thus aid in making the enterprise more profitable.

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Sweet potatoes have been shown to be a good source of vitamin C.

American Animal Hospital Association Atlantic City, New Jersey, May 2-5, 1951

The literary program for the 18th annual meeting of the A.A.H.A. has been announced. The general sessions will convene at the Chalfonte-Haddon Hall, Atlantic City, N. J., on Thursday morning, May 3. A golf tournament, annual feature of this convention, committee meetings, and reception for members, guests

Dr. J. Raymond Curry

and exhibitors, opening with a breakfast on May 2, will precede the literary program.

Included among timely subjects of interest to veterinarians handling small animals will be presentations by Dr. Frank Bloom of Flushing, N. Y., who will speak on the subject of nephritis; Dr. L. Michaud, Rahway, N. J., who will present the latest information on cortisone and ACTH; and Dr. Victor Cabasso, who will report on research work with canine distemper and related diseases. Other features will be papers on hepatitis in dogs, spinal paralysis, fracture fixation, eye diseases, some special surgical procedures, business and financial management, and others.

Dr. J. Raymond Curry, Washington, D. C., will preside at this convention.

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Dr. R. B. Birch, emeritus research professor of veterinary medicine at the New York State Veterinary College, Cornell University, Ithaca, N. Y., and Dr. I. E. Newsom, president emeritus, Colorado A. & M. College, Fort Collins, Colo., and former dean of the Veterinary School at the same institution, are making a survey of animal diseases in the European countries now receiving aid under the Marshall Plan. The four-month assignment will allow visits to Great Britain, western European and some Mediterranean countries. Their headquarters while in Europe will be Paris.

Machine Answers Telephone and Takes a Message

An improved attachment for the telephone in office or home will automatically answer an incoming call in the absence of an attendant, and record any message the caller may want to leave. In addition, it can be used to record a two-way telephone conversation, and also a speech or sound apart from those transmitted on the telephone line.

Inventors are Assen Jordanoff and Norman Robin, New York City. Jordaphone Corporation, of the same city, has secured the patent rights by assignment.—*S.N.L.*

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Bathing in Lake Michigan, Milwaukee, Wis.

Visitors to the A.V.M.A. Milwaukee convention, August 20-23, 1951, will find relaxation on the cool, sandy beaches of Lake Michigan—just a few blocks from the convention headquarters.

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Dr. T. O. Brandenburg Honored

Dr. T. O. Brandenburg, Executive Officer and State Veterinarian for North Dakota, was honored for his contributions to the livestock industry of the state by having his picture hung in the "Hall of Fame" of the Saddle and Sirloin Club of the State Agricultural College at Fargo.

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Deficiency of vitamin A in rations for gilts and sows can cause several diseases and defects of baby pigs.

Television for A.V.M.A. Milwaukee Convention Visitors August 20-23, 1951

An innovation in method of presentation, to be employed at the coming A.V.M.A. convention, will make possible demonstrations that everyone can see. Closed-circuit telecasting, a device in limited use in medical schools to present directly to groups surgical procedures at the moment they are being performed, may well revolutionize proceedings of many large veterinary meetings. Previously such direct viewing necessarily has been limited to a few spectators.

Present plans for the Milwaukee meeting call for demonstration of anesthesia in large animals, laboratory technics, surgery in both large and small animals, poultry disease diagnosis, and other items to be scheduled. These demonstrations will be set up under the camera and be immediately projected on a large television screen in the meeting room of the Milwaukee Auditorium. In this manner, visiting veterinarians will be able to view from meeting room seats procedures that were formerly demonstrated at "wet clinics." All will thus have opportunity to observe close-up, which formerly was possible for only a few.

The device of closed-circuit telecasting has been successfully utilized at medical meetings, according to advice from A.V.M.A. headquarters. Favorable reception of these meetings has led the Pitman-Moore Company, Division of Allied Laboratories, Inc., to underwrite the added cost for the meeting this summer. The Radio Corporation of America (RCA) is cooperating by handling the mechanical aspects of these presentations.

Exciting prospects of learning by seeing, as well as hearing, national authorities and specialists in many lines are reflected in interest shown.

Plans are being made to accommodate a record attendance at this year's convention.

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Dermatitis, necrosis of interdigital tissues, and arthritis of the coffin joint constituted 53% of 116 cases of necrobacillosis of the bovine foot studied by Flint and Jensen. The exciting cause was *Actinomyces necrophorus.* Predisposing causes were not determined but mud and manure and superficial trauma are considered to be possible predisposing factors. The possibility of another infectious agent being the primary cause was not eliminated in this work.—*Jour. Vet. Res.*, 12:5 (Jan.), 1951.

Brucellosis in Slaughtered Hogs

An investigation of the incidence of brucellosis in hogs slaughtered in a Chicago plant is reported by McCullough, *et al.* (*Pub. Hlth. Repts.*, 66:205 [Feb. 16], 1951).

Lymph glands removed by inspectors were immediately cultured and the results tabulated over a sampling period of six months. Over 5,000 cultural studies were made, from 35 of which Brucella organisms were isolated, or from 0.7% of the samples. Specific typing methods revealed the following species: *Br. abortus* 10; *Br. melitensis* 11; *Br. suis* 14.

These results cannot be interpreted as representative of infection in swine. It may represent only those most heaviily infected. The author further points out that when one considers the chance of isolation of organisms from a single lymph node of an animal, the reported incidence is surprisingly high and may actually be considerably higher in Corn Belt swine. Also, it is logical to suspect a higher incidence in breeding than in market hogs.

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Britons Go Off Meat Diet

The state of affairs in Britain, says William H. Chamberlin in *The Wall Street Journal*, is the latest convincing exhibit for the proposition that socialism and compulsory vegetarianism go hand in hand. Meat has always been an important item in the diet of England, a country which has never been distinguished either for the finesse of its cooking nor for the quality and variety of its fruits and vegetables. An Englishman, vegetarian by choice, would be a rare character.

We are not so far ourselves from the conditions which produced Britain's dismal meat muddle. We should learn from this warning experience to keep the wheels of production and trade as unclogged of bureaucratic controls as possible.

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Passage of a "pound law" by the South Dakota legislature and signed by the governor, February 15, 1951, brings to a total of three, states that have recently passed legislation providing animals needed for medical experimental purposes from establishments for impounding, care and disposal of animals seized by lawful authority.

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Vitamin E does not appear to be essential for reproduction in cattle.

Military Deferment for Veterinary Students

A strong plea for military deferment for prospective students of veterinary medicine was voiced after a conference of educators representing veterinary schools participating in the regional education program in the Southern states.

The importance of veterinary service to the South's rapidly growing livestock industry is recognized by these leaders. If the man in uniform is to be well-fed and well-shod, veterinarians must be made available to serve the front producing meat and leather.

Formal resolution voicing these concepts has been sent to Chairman of the National Advisory Committee to the Selective Service System. Deferments are requested, not only for students now enrolled in veterinary schools, but for a sufficient number of selected preveterinary students to keep a steady flow of applicants to meet the needs of the nation. Dr. R. S. Sugg, Dean, School of Veterinary Medicine, Alabama Polytechnic Institute, M. T. Harrington, President, A. & M. College of Texas, and Dr. Thomas J. Jones, Dean, School of Veterinary Medicine, University of Georgia, made up the Resolutions Committee.

Representatives of 12 states have agreed on quotas which will provide for 127 beginning students in veterinary medicine at five southern veterinary schools in September 1951. Under the regional program students are admitted without paying out-of-state fees, and their states pay the institution $1,000. annually per student. With 150 students now enrolled under regional contracts expected to return to classes this fall, there should be 277 students receiving veterinary training under the program now operating. The five existing institutions (Alabama Polytechnic Institute, Auburn; University of Georgia, Athens; Oklahoma A. & M., Stillwater; A. & M. of Texas, College Station; and Tuskegee Institute, Tuskegee, Ala.) will share the $277,000. paid by states having no veterinary school.

Kentucky plans to participate for the first time this year, being the 12th state to enter the cooperative effort in veterinary training by five schools to serve the requirements of the entire region. In addition to Kentucky, Alabama, Arkansas, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia cooperate in the regional education program.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Supplementing normal rations of cows in late gestation with vitamin A was of no value, according to a foreign report, in increasing the vitamin A content of colostrum. The effort was to assure the greatest possible resistance to infection in newborn calves. It was concluded that any additional disease resistance possible from vitamin A could be obtained only from its administration in high dosage to calves. In a herd in which colibacillosis had been a problem for some time, the vitamin was supplied beginning with the first feeding. In this instance it proved an effective prophylactic agent. If the supplementation was delayed until the third day of extra uterine life, it had no value. Much of this is not in accord with the results obtained by investigators in the United States.

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It appears from a perusal of current literature that a cause of abortion in sheep is *Vibrio fetus*. When it is the etiological factor, the organism may frequently be demonstrated in the stomach of the aborted young. Since a second outbreak in the same flock during succeeding seasons is rare, it is theorized that a strong immunity has been established. Other organisms and factors mentioned that may be possible for abortion include *Brucella abortus* and *Br. melitensis, Bacterium coli,* and *Salmonella abortusovis,* as well as nutritional mismanagement.

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Equine encephalomyelitis virus is known to be a heavy albumen of such an unstable nature that up to this time an exact analysis of it has not been possible. It has at least three variants —the eastern, western, and St. Louis. The cultivation of the virus on the chick embryo, plus intradermal vaccination are the two important steps in the control and prevention of "sleeping sickness" in horses.

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Research in the field of general anesthesia for dogs points to the possibility of using an electric current, passed through the brain, to produce prolonged general narcosis. Weak currents seem to result in motor paralysis—stronger currents produce complete sensory anesthesia.

Biddis (*Vet. Rec.*, Dec. 30, 1950) states that a preparation having the brand name of dicestal has proved to be a highly satisfactory taeniacide, in his practice, for dogs. The drug causes the tapeworms to undergo "a rapid degenerative process within the intestinal tract, and results in their excretion in unrecognizable form in the feces." It is claimed to be safe, causing only minor discomfort to the dog. The recommended dose of dicestal is 0.5 gm. for each six to eight pounds of body weight, administered immediately before the daily main meal. No other food is allowed during the day. Some veterinarians believe it a disadvantage not to be able to demonstrate segments after medication, and others are not so thoroughly convinced that all portions of the parasites are removed.

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Venancio Calisti, of the Universita di Camerino, indicates that in the testing of a synthetic abortifacient, dipropionato dietildiossistilbene, his results permit him to assume that in doses varying from 3 mg. to 150 mg. he was able to produce premature births in ewes. To get this result the dose must be gradually increased "during the duration." He reports that if the abortion takes place during the last month of gestation, the expulsion of the fetus may be followed by a septic metritis.

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Wounds do not heal well in the aged, the senile, and in those animals affected with nutritional disturbances. A surgeon is to be held responsible for retarded and unsightly healing if during an operation he subjects a wound to rough manipulation, excessive use of sharp-pronged forceps and retractors, and a disregard of aseptic practices.

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Fox and Roberts of the Department of Medicine and Ambulatory Clinic, New York State Veterinary College, in its 52nd Annual Report, indicate that in the treatment of blackleg, probably also malignant edema, they have observed excellent results following the intramuscular use of 900,000 units of penicillin twice daily for four days. In some cases, sulfamethazine was also used, and in others, antiserum.

VETERINARY PARASITOLOGY

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Virus Anemia versus Eperythrozoonosis of Swine

The etiology of swine icteroanemia has become a controverted subject, and veterinarians, parasitologists, and others will be alert to more definitive information. Probably, this should not be regarded as an unhappy situation, since historically, controversy has heralded the coming of sound information on the causative agents of many diseases, both human and animal. At least, the authors of recent papers on swine anemia have imparted new life to the subject.

Only last May, Splitter and associates,[1] of Kansas State College, published convincingly on the etiologic role of a protozoan blood parasite which Splitter[2] named *Eperythrozoon suis*. The disease was experimentally reproduced and cures with neoarsphenamine were reported. Significantly, a second species, *E. parvum* was also described, but the morbid condition was not associated with its presence. The situation to this point has only recently been reviewed in this journal[3,4]. In January of the current year, however, Foote, *et al.*,[5] of the Oklahoma Veterinary Research Institute, reported that the etiologic agent was, in fact, a filtrable virus. Inasmuch as they appear to have reproduced the disease with filtrate (using 12-lb. Mandler bacteriological filters), their findings are at least as convincing as Splitter's, although deficient in many respects. In any event, the Oklahoma workers did not neglect to re-christen both the disease and its causative agent — "virus anemia of swine" caused by "the virus of Farley." Nor did they neglect to introduce another chemotherapeutic agent for the disease, namely, aricyl, although some allowance was made for the beneficial action of neoarsphenamine. Moreover, they determined that *Eperythrozoon suis*, as well as *E. parvum*, are "reactionary bodies," "artifacts," or bodies "coincidental with the disease." We are fortunate to have this timely reminder that we live in a country where even science offers some choice rather than in one where truth is made by decree without resort either to science or debate.

[1] *Jour. Am. Vet. Med. Assn.*, 116:360 (May), 1950.
[2] *Science*, 111:513 (May 12), 1950.
[3] *Vet. Med.*, 45:335 (Aug.), 1950.
[4] *Vet. Med.*, 46:14 (Jan.), 1951.
[5] *N. Am. Vet.*, 32:17 (Jan.), 1951.

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Defense Needs Affect Supply of Anthelmintics and Insecticides

For the second time within a decade, the nation's defense economy has imposed shortages of certain reliable and widely used antiparasitic chemicals. Chief among these are phenothiazine and benzene hexachloride. Compounds from which these are synthesized, such as benzene and diphenylamine, are of primary importance to preparedness, even essential in the manufacture of gunpowder as well as other ammunition and weapons. Shortages will probably be temporarily felt or threatened until machinery for authoritative allocations becomes functional. However, because of the recognized necessity of safeguarding the food supply under emergency conditions, it may be presumed that adequate, but not excessive, amounts of necessary materials will be made available for antiparasitic uses. So far as can be determined, therefore, present conditions appear to be no cause for alarm on the parts of veterinarians, stockmen, or manufacturers. Nevertheless, it seems advisable to re-emphasize that materials used in the war against parasites are ammunition and, like ammunition, should be used not too sparingly but wisely and effectively.

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Mange in Goats in India

Sarcoptic mange has long been regarded as a serious disease of goats in India. A recent article[6] states that local shepherds insist that 60 to 90% of their goats die from this disease and that innumerable treatments have proved disappointing. Deaths result chiefly from the indirect, insidious, and concomitant effects of inanition. Forty-two deaths from mange were noted in a flock of 85 animals. There were no losses after two dippings in a 2% suspension of Gammexane 520 (a benzene hexachloride product); the disease was cured and infestations eradicated. Interestingly, the condition affects attendants but is said to be not transmissible to sheep.

[6] Singh, B., Sarcoptic Mange in Goats., *Ind. Vet. Jour.*, 27:128 (Sept.), 1950.

PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
Atlanta, Georgia

A survey of the public health in Missouri, 1951, by the American Public Health Association staff, directed by Roscoe Kandle, M. D., emphasizes the value of a well trained public health veterinarian in the state health department. The following are excerpts from their published report:

Veterinary Public Health: A "new" program, or an old program with a new approach, is exemplified by the presence of a well trained public health veterinarian (Dr. E. R. Price) in the Division of Health. It is especially pertinent to Missouri with its large rural interest, although there are also urban problems involving animal diseases transmissible to man.

The program has made progress through the skill of the staff and through the wisdom and support of the Public Health Director. Such a program can be abundantly justified on several cases such as:

1. Public health and epidemiological methods can make substantial contributions to the control of animal diseases transmissible to man.

2. It provides a method of bringing the entire public health team and organization to bear on these important health and economic hazards.

3. It can speed the eradication of such diseases as rabies, which needlessly cost the life of a young man recently. It is also a serious economic and health problem for those who must be given rabies vaccine.

4. The efforts of both the health and other workers can be made more effective by joint action.

5. The rarer diseases which attack animals and man might well be the agents by which bacteriological warfare could be used against us.

Tularemia and rabies have occupied much of the attention of the program so far. The reporting of diseases transmissible to man as they occur in animals is under discussion.

In the opinion of the surveyors this is a worthwhile activity which should be continued.

Almost one-half of the states have veterinarians in the state health departments who are active in communicable disease control, food sanitation and public health administration. The state veterinary associations have been strong supporters of the inauguration of these programs by state authorities in some states. All successful public health programs must have the support of the clinical practitioners.

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The Veterinary Aspects of Atomic Energy are discussed by Lt. Col. John H. Rust, V.C., U. S. Army, in the February 1951 issue of the *Military Surgeon*. Colonel Rust points out some of the possible problems that may arise from an atomic bomb explosion, such as food contamination and animal exposure. These hypothetical problems vary according to the type of explosion, *i.e.*, underwater, low air or high air. The damage due to blast, heat and radiation effects are also different. It is only at the periphery of the affected area that any salvage of food or animals could be attempted. Everything within the center of the affected area in most cases would be destroyed by heat or blast or secondary fires, according to observations made in Japan.

Three excellent tables summarizing the damage to food animals and packaged foods are presented. Every veterinarian should be acquainted with them. Table I has the effect of high air blast, table II the effect of low air blast, and table III the effect of underwater blast upon food animals and packaged foods. Colonel Rust recommends that animals which are exposed to radiation but do not have immediate acute radiation effects would be suitable for immediate slaughter. If there is any delay, he would be hesitant in using them because of the marked invasion of the blood stream by bacteria from the gastrointestinal tract. This theory is based on the extrapolation of information obtained from studies on mice whose whole bodies were irradiated.

The conclusion of the paper points out how radioactive tracers are being used in research. The work with radiophosphorus and radiostrontrium in mosquitoes is cited and the suggestion is made that a disease like equine encephalomyelitis can be studied by similar technics. The successful use of radioactive molybdenum, copper, phosphorus and cobalt in understanding certain deficiency diseases is stimulating. The author points out, and we certainly agree, that there are great opportunities for research in veterinary medicine with radioactive materials, especially in the clinics.

Cestodiasis in the Chinchilla

PAUL M. NEWBERNE, D.V.M., Auburn, Alabama,
and STUART E. BURNETT, D.V.M.,
Columbus, Georgia

There are only a few cases reported in the literature of cestodiasis in chinchillas. Seven cases of infection with the coenuri of *Multiceps serialis*, observed over a two-year period, were reported by Bracken and Olsen[1]. The natural infection of a chinchilla with the mouse tapeworm, *Hymenolepis nana* var. *fraterna*, was reported by Olsen[2]. It is the purpose of this paper to present a report of infection with the larval stage of *Taenia pisiformis* and an additional instance of coenurosis in the chinchilla.

Case A—Cysticercosis

The first sign of illness in this animal, a two-year-old female, was the presence of blood in the nest box on the morning when the animal was found in a moribund condition. There was a slight prolapse of the rectum; death occurred within an hour.

On autopsy, there were lesions of a severe metritis and generalized septicemia. The animal had been bred 30 days previously and the two fetuses present had been dead several days. Three cysts were found immediately under the capsule of the right and left lateral lobes of the liver. The cysts were approximately 5 to 10 mm. in size. On incision, scolices were found which were identified as the larval stage of *Taenia pisiformis*. As far as the writers have been able to determine, this is the first reported case of cysticercus of this tapeworm in the chinchilla.

The adult *T. pisiformis* is one of the most common tapeworms of the dog, cat, and related carnivores. Infection of the rodent intermediate host may result from the contamination of the feed by feces from animals harboring the adult worms. Following ingestion of the eggs the oncospheres emerge and penetrate the intestinal mucosa. They are carried in the portal circulation to the liver where they migrate through the parenchymal tissue before coming to rest under the capsule. Soon many of the larvae break through the capsule and are found in the peritoneal cavity. The same precautionary measures recommended by Bracken and Olsen (*loc. cit.*) for the control of infections with the larval stage of *Multiceps serialis* would be applicable in preventing infections with this parasite.

Fig. 1. View of the whole cyst.

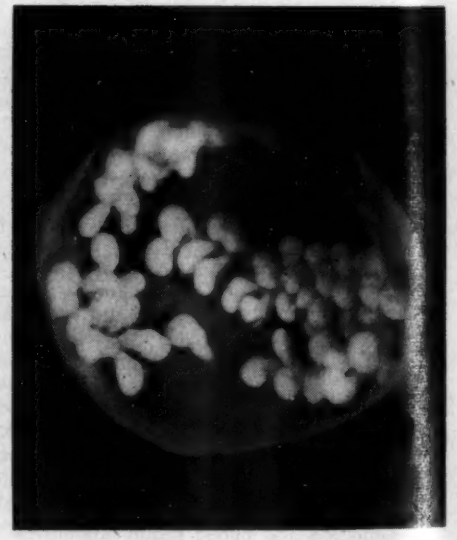

Fig. 2. Cyst cut in half. Note thin cyst wall and many scolices grouped within the cavity.

Case B—Coenurosis

The first evidence of infection in this animal was the detection of a firm mass, which could be easily displaced on palpation, in the subcutaneous connective tissue in the lateral cervical region just posterior to the base of the right ear. Since there was no evidence of a

Fig. 3. Cut section of scolex (125X).

local increase in temperature nor pain the mass was removed surgically in the manner described by Bracken and Olsen (*loc. cit.*) using local procaine anesthesia. The cyst was found to be a coenurus containing many invaginated scolices (fig. 1 and 2). In as much as the specimen was placed in a fixing solution on removal it was not possible to make a specific diagnosis by examination of evaginated scolices or by xenodiagnosis. The gross appearance was characteristic of the larval stage of *M. serialis*, which it is presumed to have been.

REFERENCES

1. Bracken, Frank K., and Olsen, O. Wilford., Coenurosis in the Chinchilla. *Jour. Am. Vet. Assn.*, 116:440, 1950.

2. Olsen, Wilford O., Natural Infection of Chinchillas with the Mouse Tapeworm, *Hymenolepis nana* var. *fraterna*. *Vet. Med.*, 45:440, 1950.

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The opossum equals or beats the rabbit in the multiplication game; the female cottontail produces a yearly average of 17 young in four litters, while the opossum does the same in two litters.—*S.N.L.*

Good Nursing Pays Off

L. S. McCANDLESS, D.V.M., Craig, Colorado

An owner called me to attend a grade dairy cow after the animal had been down with milk fever for more than 12 hours. Temperatures had been extremely cold and at the time I arrived at the ranch it was 35 degrees below zero.

Intravenous injection of calcium gluconate was given, after which the patient rallied somewhat, but was unable to rise. She apparently was chilled to the point of muscular incoordination.

Noticing a pile of cinder blocks in the yard, I had some taken to the house and heated in the kitchen oven and on the stove, so that about 15 large blocks were well warmed. A blanket was placed over the cow and the blocks stacked around her. A heavy canvas was thrown over cow and blocks. After two hours of warming, she got up and thereafter made an uneventful recovery. The nursing care in this instance assured success; without such care, the animal would have been lost.

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Dipylidium Caninum in a Child

R. F. VIGUE, D.V.M., and C. E. RICHARDS, M.D., Sanford, Maine

A child, healthy male, 14 months of age, had been passing what one of us (C.E.R.) believed at first to be pinworms, *Enterobius vermicularis*. Five to six were found in each stool for several months. The recommended therapy for pinworms had no effect and the child was referred to the Maine General Hospital in Portland. The parasites could not be identified at that institution. Some of the specimens were submitted to one of us (R.F.V.) for comparison with animal parasites as the family owned both a cat and dog.

Five ripe proglottids resembling cucumber seeds were presented, as was a fecal specimen. The segments were compared to those of the common dog tapeworm, *D. caninum*, both macrosopically and microsopically, and were found to be identical. The pets were known to be harboring fleas, the most common intermediate hosts, but *D. caninum* was recovered only from the dog.

The human case of taeniasis was believed to have been acquired by the child's swallowing cysticeroid infected flea, or fleas, infesting either of the animals.

Aureomycin in the Treatment of Bovine Brucellosis*

H. S. BRYAN. D.V.M., M.S., and L. E. BOLEY, D.V.M., M.S., Urbana, Illinois

Aureomycin, an antibiotic derived from the actinomycete mold, *Streptomyces aureofaciens*, has proved effective in the treatment of brucellosis in man. Spink, *et. al.*,[1] Schoenbach, Bryer and Long,[2] Bryer, *et al.*[3] and Bruade, Hall and Spink,[4] successfully treated human infections caused by *Brucella melitensis, Br. suis,* and *Br. abortus.* To determine the effectiveness of aureomycin in treating bovine brucellosis, a preliminary observation was made in one cow which was naturally infected with *Brucella abortus.* The present report describes the effect of aureomycin in this one animal.

Materials and Methods

The cow used for this experiment originated in a previously Brucella-free Guernsey herd in which vaccination with strain 19 or other Brucella vaccines had not been practiced. She was 16 years of age and weighed approximately 1,000 pounds. One year prior to this experiment, the herd had become severely infected with Brucella. This animal was a reactor to the blood serum agglutination test and was secured for experimental work.

The cow was given two courses of treatment. In the first course, 2.5 gm. of aureomycin in 250 ml. sterile distilled water was administered intravenously every 12 hours for 12 days. In the second course, which was begun 44 days after the end of the first course, udder instillations of aureomycin were made in addition to intravenous administration. On the first day of treatment the cow was given 10 gm. of aureomycin in 500 ml. of water intravenously in two divided doses and 200 mg. of aureomycin in an ointment base per quarter in the udder. Udder instillations were made immediately after milking. On the second day and for the remaining ten days, 5 gm. of aureomycin in 500 ml. sterile distilled water was administered intravenously daily in a single dose. The udder was not treated on the second day. For the remaining ten days, aureomycin was instilled into the udder once a day at the rate of 200 mg. per quarter per day. (Table 1.)

The milk was cultured periodically for *Br. abortus* during the course of the experiment. No hemocultures were made. The rapid plate, blood serum agglutination test was used in determining Brucella antibody titers.

Aureomycin levels in the blood serum were determined twice daily during each period of medication. One blood sample was collected immediately preceding each injection and another sample ten minutes after injection. The procedure described by Herrell and Heilman[5] was used to determine blood levels.

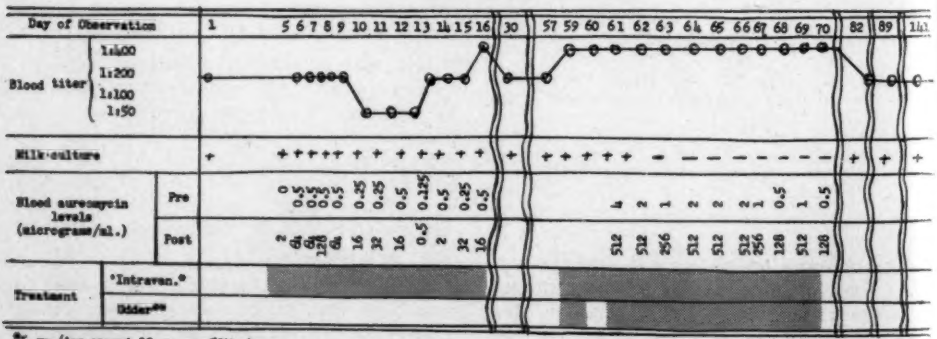
Result

In the first course of treatment, aureomycin administered intravenously had no appreciable lasting effect on the level of Brucella blood agglutinins or on the presence of organisms in the milk. In the first trial, the antibody titer

*From the Departments of Veterinary Pathology and Hygiene and Veterinary Clinical Medicine, College of Veterinary Medicine and Agricultural Experiment Station, University of Illinois, Urbana. The aureomycin was supplied by Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y.

TABLE 1. TREATMENT OF BOVINE BRUCELLOSIS WITH AUREOMYCIN

DATA ON ONE COW



*5 gm./day except 10 gm. on 59th day.
**200 mg./ day.

dropped slightly, and then rose slightly above the original titer. *Br. abortus* was isolated from the milk during and after medication. The aureomycin levels in the blood serum varied in the preinjection samples from 0 to 0.5 micrograms per ml., and in the postinjection samples from two to 128 micrograms per ml.

In the second course of treatment simultaneous intravenous injections and udder instillations of aureomycin did not change the blood antibody titer, but did eliminate Brucella from the milk for a short period of time. The blood antibody titer was 1:400 on the first day of treatment, and remained the same during the course of treatment. The fourth day after the initial udder medication, the milk cultures became negative for Brucella and remained negative for the remaining period of udder medication. However, when the milk was again cultured 11, 18 and 70 days after udder treatment had been discontinued, the organism was reisolated. The serum aureomycin levels varied in the preinjection samples from 0.5 to 4 micrograms per ml., and in the postinjection samples from 128 to 512 micrograms per ml.

No systemic disturbances were observed in the cow during or following either series of treatments with aureomycin.

A tube dilution turbidimetric method employing subcultures on tryptose agar was used to determine the *in vitro* sensitivity of the Brucella strain isolated from the milk. The growth of the organism was completely inhibited by 12.5 micrograms of aureomycin per ml. of medium. This figure indicates that the organism was not highly sensitive to the antibiotic.

Discussion

The criteria for cure in Brucella-infected cows are the elimination of Brucella from the milk and recession of blood agglutinins. The treatment administered to this cow did not materially affect the level of blood agglutinins. The blood titer was 1:200 at the beginning of the experiment. It fluctuated from 1:100 to 1:400 during the course of the experiment and was 1:200 at its end. Aureomycin udder medication eliminated the Brucella organism from the milk temporarily, but when udder treatment was discontinued the organism reappeared in the milk. Obviously this cow was not cured.

Summary

Intravenous administration of 2.5 gm. aureomycin every 12 hours for 12 days did not reduce the blood agglutinin level or eliminate *Brucella abortus* from the milk of a naturally infected cow. Intravenous treatment with 5 gm. per day for 12 days combined with infusion into the udder of 200 mg. per quarter per day for 11 days temporarily eliminated Brucella from the milk, but did not affect the blood agglutinin level. No systemic disturbances were noted during the course of aureomycin treatment.

REFERENCES

1. Spink, W. W., Braude, A. I., Castaneda, M. R., and Sylva-Goytia, R., Aureomycin Therapy in Human Brucellosis due to *Brucella melitensis*. *Jour. Am. Med. Assn.*, 138:1145, 1948.

2. Schoenbach, E. B., Bryer, M.S., and Long, P. H., The Pharmacology and Clinical Trial of Aureomycin: A Preliminary Report. *Ann. N. Y. Acad. Sc.*, 51:267, 1948.

3. Bryer, M. S., Schoenbach, E. B., Wood, R. H., and Long, P. H., The Treatment of Acute Brucellosis with Aureomycin. *Bul. Johns Hopkins Hosp.*, 84:444, 1949.

4. Braude, A. I., Hall, W. H., and Spink, W. W., Aureomycin Therapy in Human Brucellosis Due to *Brucella abortus*. *Jour. Am. Med. Assn.*, 141:831, 1949.

5. Herrell, W. E., and Heilman, F. R., Aureomycin: Studies on Absorption, Diffusion and Excretion. *Proc. Staff Mtg., Mayo Clin.*, 24:157, 1949.

Addendum

Since the preparation of this paper Larsen and Gilman published a report on aureomycin as a treatment of acute brucellosis of cattle. (See *Cornell Vet.*, 40:259, 1950.)

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Vibrio fetus Infection

The French medical press recently reported *Vibrio fetus* infection in pregnant women. The patients were mildly ill, with abortion in one case, premature delivery at six months in another case, and the third woman delivered normally at term. There were no other acute symptoms. The placental lesions were neurotic foci localized on the fetal placenta. Illness ceased after expulsion of membranes. The organism was grown from blood samples inoculated into ordinary citrated broth. Inoculation of the organism into pregnant guinea pigs caused abortion in three to four days. The serum of the affected women agglutinated strains obtained from animals.

It would be interesting to hear more about these isolation, animal inoculation, and agglutination technics which were apparently so successfully used by the author. Most American investigators have had to use fortified media under CO_2 tension. The organism usually does not grow readily in guinea pigs and agglutination tests are still experimental.

A Therapeutic Approach to Winter Dysentery in Dairy Cows

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Vibrionic dysentery, or winter dysentery, occurs quite frequently in dairy cattle in Michigan, as well as in other milk producing areas, and results in a serious economic loss to dairymen in lowered milk production. The infection, generally believed to be *Vibrio jejuni*, is confined to the intestinal tract. Barring complications, the infection seldom terminates fatally. The profuse watery diarrhea produced during the course of the attack, five to seven days, results in extreme dehydration. Despite the fact that the affected animal's appetite remains but slightly impaired, if at all, there is a drastic reduction in milk production.

Common therapeutic procedure is the administration of intestinal protectants and astringents to counteract the irritant effect of the organism. Such therapy has been reported as being variously effective in alleviating the symptoms and shortening the course of the malady.

The work of Watson[1] completed in 1944, revealed that solutions of copper salts, particularly copper sulfate, when brought in contact with the mucous membranes of the mouth and pharynx of sheep created a reflex nervous reaction upon the esophageal groove, affecting its closure, making possible the passage into the abomasum of suspended material subsequently administered. This inspired the following therapeutic procedure in the malady.

Preparation for Therapy

Since the seat of infection is in the intestinal tract and since it was considered desirable to by-pass the fore stomach so that the therapeutic agent to be employed could reach the abomasum and finally the intestine in concentration, the application of this physiological process or phenomenon promised the solution. Thus, the following therapeutic procedure was initiated.

First, the closure of the esophageal groove was affected (believed to be affected) by the administration of 4 oz. of 1% solution of copper sulfate with a dose syringe making possible contact with the mucous membranes of the mouth and pharynx; the seat of nervous control over the esophageal groove. Second, the immediate subsequent administration by dose syringe of 360 to 480 gr. of sulfathaladine or sulfaquanidine suspended in a pint of water. Only one treatment was administered in each case.

Following this therapeutic procedure, the course of the malady in several dairy herds was checked abruptly. Feces began to solidify in many cases within a period of less than 24 hours, and milk production was observed to improve rapidly toward the previous normal level.

While the work reported by Watson was done on sheep, the results thus far observed following the method outlined above for winter dysentery in dairy cattle leads to the belief that the physiological effect of copper sulfate is equally operative in the dairy cow.

Further studies are in progress to determine the efficiency with which access to the abomasum is being accomplished by this physiological process, to determine the minimal effective dose of the enteric sulfonamides, and whether or not certain antibiotics can be thus effectively employed in this anomaly.

REFERENCE

1. Watson, R. H., Janrett, I. G., Observation on the Influence of Copper Sulfate on the Course Taken by Liquids into the Stomach of Sheep. Bul. 180, Commonwealth of Australia, Sydney.

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Skunk or civet cat rabies is making its annual appearance in the states between the Mississippi River and the Rocky Mountains. Rabies has been recognized in these wild animals for the past 75 years. Some of the earliest reports, being those of the U. S. Army Medical Corps, tell of losses of men and horses to skunk rabies in the 1870 decade in Kansas and Nebraska. There has been a great deal of confusion about the names applied to the skunk or civet cat. They are two different animals. The common skunk, or the large striped skunk, is of the genus Mephista, while the small spotted skunk, which is called the civet cat, is of the genus Spilogale. Both of these animals are found all over the United States, east of the Rocky Mountains. There is another animal, the cocomistle, a relative of the marten, found in the Southwest and Pacific Coast areas which is called a civet cat. Wildlife biologists state that the true civet cat is found only in Europe and Asia. It is a member of the Viveridae family, to which the mongoose is closely related. The wild animal reservoirs of rabies have become increasingly important in the past decade, especially in areas where canine rabies has been brought under control. In those areas it remains the only known reservoir of the disease.

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ABSTRACTS OF LITERATURE

Therapeutic Control of Q Fever in Cattle Unsatisfactory

Infected dairy cattle have been established as the source of Q fever in man. Intensive studies in the Los Angeles, Calif., milk shed have demonstrated *Coxiella burnetii*, the rickettsial causative agent, in 10% of dairy cows studied.

These animals shed organisms continuously or intermittently for periods extending beyond a single lactation. Besides the isolation of the Rickettsia in the milk, these organisms have been isolated from the mammary glands and adjacent lymph nodes of slaughtered cows and from placental membrances. Urine and feces are also rich sources for isolation of these organisms.

Q fever is asymptomatic in cattle, which may be said to be incidental hosts. Cell count of milk from known infected quarters reveals no significant difference from non-infected quarters. Dairy cows serve as a reservoir of human infection of considerable importance.

Studies are reported on the intravenous injection and intramammary infusion of aureomycin as a means of controlling milk contamination[17]. Following the intramammary infusion of 100 mg. of aureomycin in saline solution twice daily for five days, only two of 33 quarters were cleared of organisms; one of these resumed shedding within a few days. Intravenous injections of a total of 15 gm. of aureomycin over a five-day period also failed to eliminate *C. burnetii* from the milk of nine of ten infected animals.

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Vitamin T[11]

Feeding an agent called vitamin T or torutilin at the rate of 200 mg. per chick daily with grain rations reduced flock mortality 40%; increased growth and weight of chicks during the brooding period; effected early maturity in hens, which began laying two weeks earlier than controls; and increased egg production by 100% during the first six months.—*R.S.*

[17]Luoto, Lauri, D.V.M., M.P.H., Huebner, Robert J., M.D., and Stoenner, Herbert G., Q Fever Studies in California, XII. Aureomycin Treatment of Dairy Cattle Naturally Infected with *Coxiella burnetii*. Pub. Hlth. Repts. 66:199 (Feb. 16), 1951.

[11]Sedlnitzky, M. *Wien. Tieraerztl. Monatsschr.*, 37:644, 1950.

Bacterial Flora of the Genitalia of Bulls

Little information is available in veterinary literature on which to assess the importance of bulls in establishing genital infection in cows.

Increasing employment of artificial insemination multiplies the dangers of disease dissemination possible without an adequate health standard being required for breeding males used. A study[10] to determine the bacterial flora of 45 normal bulls and five steers when slaughtered, revealed no bacteria in the testicles, epididymides, ampullae of the vas deferens, seminal vesicles, prostate, or bulbourethral glands. In all of the 50 specimens collected, these organs were considered to be bacteriologically sterile. Bacteria were found in the urethra of nine specimens immediately caudal to the prostate, in 15 at the sigmoid flexure, in 36 at the caudal glans and in all on the surface of the glans penis and the prepuce. Ten species of microorganisms, of over 40 isolated from the terminal urethra and the prepuce, have been associated with pathologic condition. Whether all of these are important if transmitted to female genitalia on breeding or by artificial insemination is not established.

Organisms present did not produce macroscopic lesions. Urethral infections present were thought to result from external contamination. Since it has been demonstrated that definite pathogens (*Brucella abortus*) may exist in the genital tract without producing macroscopic lesions, the hazards of using bulls harboring pathogenic microorganisms is apparent.

More extensive investigations are necessary to aid in controlling genital infections of cattle and in developing standard methods of collection, processing and examination of all bull semen used for artificial insemination.

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Diseases of metabolism, of which acetonemia in cattle and ketosis (pregnancy disease) of sheep are examples, may respond to cortisone therapy. Experimental work with this hormone is now under way in a number of experiment stations in the United States.

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The present main uses of industrial molasses are in alcohol making and cattle feed.—*S.N.L.*

[10]Ruebke, H. J., Bacterial Flora of the Bovine Male Genitalia. *Jour. Vet. Res.*, 12:14 (Jan.), 1951.

VETERINARY ITEMS OF INTEREST

A filtrable virus may be one of the causes of epizootic diarrhea in calves.

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Poor management and faulty feeding practices are the primary causes of baby pig losses.

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The risk of dental caries in early life of children is reduced if drinking water contains one part per million of fluorine.

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Beef cuts in popular demand (rib roasts, porterhouse, T-bone, club, sirloin and round steaks) make up only about one-third of the beef carcass.

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Urea levels can be safely fed if total urea included in concentrates does not exceed 5%, and constitutes not over one-third of the total protein in the ration.

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The domestic fowl, *Gallus gallus,* is a pheasant. Selective breeding has produced wide variations in this species; *e.g.,* a fully grown Bantam may weigh only 800 gm., but a mature Langshan may exceed 5,000 gm.

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A blood test developed by workers at the Wisconsin Agricultural Experiment Station now apparently distinguishes between freemartin and normal heifers born as twins to a bull calf.

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Zoonoses, as applied by the World Health Organization, are those diseases, regardless of etiology, which are naturally transmitted between vertebrate animals and man and are not limited to those caused by animal parasites as ordinarily understood.

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The average distance between the points where livestock are raised and the point where meat products are consumed is more than 1,000 miles. Areas of small livestock production, but great meat consumption, brought about the growth of the meat packing industry. There are about 4,000 meat packers and about 22,500 other commercial slaughterers of animals in the United States.

"Bleached" kidney is reported to be a common postmortem finding in lightning stroke.

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Only beef and dairy cattle enterprises surpass poultry in gross income to producers.

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A chick hatched from a 2-oz. egg weighs about 38 gm. Normally its weight is more than doubled by the time it is two weeks of age.

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Since the productive life of the average dairy cow is slightly less than four years, 25% of the nation's milk producers must be replaced each year.

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The best indicator of hay quality is carotene content. Hay containing large amounts of the precursor of vitamin A usually has good color and aroma, and is leafy.

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Research on mastitis and the beneficial effects of various treatments has emphasized that good management, along with well planned treatment, is needed to minimize losses in production due to this disease.

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New, experimentally developed knowledge has never been accepted so readily nor applied so promptly to field conditions as those findings relating to the use of vitamin B_{12} and antibiotics for swine and poultry feeding.

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January 1 to November 11, 1949, the cases of rabies in dogs reported in Japan numbered 798. The persons reported bitten by rabid dogs numbered 1,712 in the same period, and the reported deaths in human beings from rabies numbered 48.

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Thirteen species of ticks, and 22 of fleas were found during a survey in Wisconsin. Most of these parasites were found on rodents, other small animals, and birds. A few were found on larger animals—horses, cattle, and deer.